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ABSTRACT

To foster individual development, educators must seek the gifts in every child, in those not demonstrating academic abilities as well as in the most brilliant. Instead of stifling thinking, creativity, and interest development, educators must encourage these behaviors. Currently, a big discrepancy exists between the child's potential and what schools actually value or stimulate. This bulletin first examines some barriers to developing children's creativity, thinking, and interests, such as low self-concept, lack of training opportunities, testing for facts instead of relationships, fragmented curricula, short-term views on course content, and negative attitudes toward creativity. Chapter 2 discusses the meaning of creativity and explores whether it should be nurtured in all children or only in the gifted and talented through a continuum of creative behaviors. Chapter 3 looks at ways to support cognitive development and the relationship between thinking and creativity. Chapter 4 treats the importance of interests in the child's learning and development and discusses types of interests, how they are structured, and the relation of interests to creativity. The final two chapters discuss practical strategies for supporting creativity, thinking, and interests at the district, school, and classroom levels. To produce Renaissance or visionary men and women will require a reexamination of play, interest development, self-regulation, and autonomy in early creative development. Included are 7 figures and 146 references. (MLH)

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# DEVELOPING CHILDREN'S CREATIVITY, THINKING, AND INTERESTS

## Strategies for the District, School, and Classroom

Leonora M. Cohen

U.S. DEPARTMENT OF EDUCATION
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# Preface

Fundamental to education is the development of children's abilities to think and to create and the encouragement of children's interest in the world around them. Surely an educational system that fails to serve these fundamental goals is in need of major revision.

Offering evidence that such a revision is indeed warranted is only one of the contributions of this provocative Bulletin by Leonora M. Cohen. She also proposes innovative and perceptive ways of conceptualizing the processes of creativity, thinking, and interest development and, most significantly for educational practitioners, suggests numerous practical strategies for giving creativity, thinking, and interests their rightful place in the school's curriculum.

The Bulletin is an expansion of ideas Dr. Cohen presented in the spring 1987 *OSSC Report*.

Leonora Cohen currently is assistant professor of education at the University of Oregon Talented and Gifted Institute. She taught for nine years in both regular and gifted classrooms. As coordinator of the Mentally Gifted Program for the School District of Philadelphia, she initiated and directed that program across the grades for 6,000 children and 130 teachers. Her dissertation, *Toward a Theory for Gifted Education*, was awarded "Dissertation of the Year" at Temple University, 1985. She has also authored numerous articles in the field.

Philip K. Piele
*Executive Secretary*

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# Introduction

> The principal goal of education is to create men who are capable of doing new things, not simply of repeating what other generations have done—men who are creative, inventive, and discoverers. (Piaget 1964)

In order to support the development of individuals who have potential to make important contributions to our world, we must look for the gifts in every child, in those who may not demonstrate abilities in academics as well as in the most brilliant. If we fail to do this, we are likely to lose our most valuable natural resource—the varied strengths of each of our citizens. We must encourage interest development as well as thinking and creative behaviors in the classroom. Instead we probably stifle them.

In this Bulletin, I first examine some barriers to the development of children's creativity, thinking, and interests. Chapter 2 is devoted to a discussion of the meaning of creativity and whether it is something to be nurtured in all children or only in the gifted and talented through a continuum of creative behaviors. Then in chapter 3, I look at ways of supporting the development of thinking and the relationship between thinking and creativity. The importance of interests in the child's learning and development is the subject of chapter 4, where I discuss types of interests, how interests are structured, and the relationship of interests to creativity.

Practical strategies for supporting creativity, thinking, and interests—addressed to superintendents and other central office administrators, principals, and teachers—are the focus of the final two chapters. In chapter 5, I provide suggestions to enhance the development of these three areas at the district and school levels, and in chapter 6, similar suggestions are directed at the classroom level.

When we, as modern educators, consider this subject, we must remember that thinking and creating in areas of interest are not new. These phenomena are inherent in humankind. They are the most natural, spontaneous, useful, and pleasurable of activities, prevalent in the human race since its dawning, for better or for worse. By engendering creativity, thinking, and interests in the schools, tempered with values and ethics, we hope to generate the possibility of a better world for all humanity, a world of thoughtful, productive, and inventive citizens.

*Chapter One*

# Barriers to Creativity, Thinking, and Interest Development

There is a big discrepancy between the child's potential and what schools actually value or stimulate. As Gruber (1985) has noted, we go into schools with short shopping lists of abilities, so we come out with only a small sack of good spellers, able readers, and high fliers in math. Do we recognize the peacemakers, the planners, and the hundreds of other strengths and interests that have such potential value to our world, and do we channel these for their fullest development?

## At Risk for Failure

Most children who enter kindergarten or first grade are bright-eyed, creative, and excited about going to school. Yet in some cases after only a few months, and in others after a few years, a large number of children become either passive or rebellious, on their way to underachievement and at risk for dropping out of school. This occurs, according to Whitmore (1987), because children make decisions about whether or not their unique needs, interests, and learning styles are compatible with the school ambience and curriculum. When the child senses a mismatch, he or she develops feelings of lack of control, fear of failure, and low self-esteem.

According to Whitmore, much of the effective schools research recommends stressing time on task rather than the appropriateness of the task, excessive repetition, curriculum that focuses on low cognitive levels, a model of teaching based on learning needs of the retarded (highly sequenced, structured, repetitive) rather than of the gifted, and the "right" way and "right" answers instead of encouraging divergent thinking. Underachievement can result, particularly for creative children.

Another major issue related to putting children at risk for failure has been introducing formal instruction to young children before they are ready for it (see Elkind 1977, 1981, 1986; Epstein 1978; Miller-Jones 1983; Sigel 1969; and Wittrock 1981). In our zeal to improve the minds of young children, curriculum that used to be reserved for first grade is being pushed down into kindergarten and even preschool. Instead of challenging children, these inappropriately higher expectations often cause children to feel like failures, and their natural curiosity and interests are suppressed, as is pleasure in learning. The net result is that children learn to be failures at an even younger age.

## Low Self-Concept

Positive self-concept is critical to school success and creativity. Many students believe that teachers are interested only in their test-taking ability, not in them as individuals (Wehlage and Smith 1986). We must learn to see students as whole beings: good at and interested in some things, not necessarily in what we are teaching. We must learn to respect, recognize, and encourage their interests and abilities without being threatened if these are different from our own. The individual must have the feelings of "I can and I will create," which stem from confidence in one's abilities and a sense of control—in short, self-esteem.

Are we aware of the fragility of the child's self-image? That an insensitive remark can wound a child, produce feelings of failure, and put children at risk? Can we create an atmosphere of safety in which students will feel they can make mistakes and learn from them? Piaget (1980b) notes that it is through recognizing one's errors in thinking that cognitive growth occurs. Gifted and creative children are especially at risk because of their unusual sensitivity and perfectionism.

## Lack of Training Opportunities

In Oregon, few university courses offer teachers instruction on creativity and interest development, individualizing instruction, or higher-level thinking strategies. Certainly, these are not required in the regular teacher training program. Can we expect teachers to teach creatively without knowledge of thinking strategies and creativity skills to meet the unique needs of each child, and without administrative support that encourages thinking, interests, and creativity in the classroom?

## Testing for Facts

We want students to master the content we teach them. We ask them

questions like: "To which class of animals does the earthworm belong?" (multiple choice, of course). Or, "In what year was the Louisiana Purchase made?" Instead, we should ask such questions as: "What would happen to an acre of land if there were no earthworms?" Or, "Compare the importance of the Louisiana Purchase to Seward's Folly. Justify your answer." These questions promote the integration of information and ideas into the student's own creative matrix and have implications for lifetime learning. We might even let students answer these latter types of test questions with an open book!

It is the relationships constructed among and between the facts—aspects of creative thinking —that are important. Memorizing facts without understanding their significance has little value. Unless active construction occurs, such facts will probably be rapidly forgotten. In fact, we know that only about 20 percent of such information is retained for more than a few hours or days.

## Fragmented Curricula

The fragmentation of curriculum—the forty-five minutes in segregated subjects or sheet after sheet of punctuation exercises—leads to compartmentalized learning with little or no transfer across disciplines and no opportunity for creativity. Can children use these punctuation skills in their own stories and poems? To this question, I have found the answer to be a resounding "NO." They have become excellent editors, knowing to look for comma errors when the ditto tells them to, but not employing them in their own writing.

We need more holistic, interdisciplinary instruction. We must help children integrate information into systems and wholes, a natural way of learning. This happens when the child is learning creatively, constructing for himself or herself and selecting the pieces that help make these wholes. Such learning is not necessarily what we determine should be learned or when (Duckworth 1972, 1979; Piaget 1973, 1977c). For example, when there is a relationship between what is studied in English and social studies, the child can gain greater understanding of both literature and history.

## Short-Term View

We teach for mastery on tomorrow's test. Yet we must ask ourselves what portion of the content will be important to the child five years from now? Fifteen years from now? Even facts we believe are truths may be disputed. Witness our changing views about the makeup and behavior of atoms, basic notions about geology in light of tectonic plate theory, beliefs that the Mayans were a pacific people who rarely sacrificed humans, Paul Revere's being

credited with the famous ride, and the unquestioned notion that dinosaurs were giant cold-blooded reptiles, to name a few.

Are our school systems still functioning on a nineteenth century model (stuffing a given body of content into supposedly receptive little sausages) or are we coping with the information explosion that is doubling the world's body of information every three years and in some fields every twenty seconds (Anderson 1986)? Will our children have the tools they need—the research skills to access the changing facts, the higher-order thinking skills to process the information, the communication skills to share it, and the creative thinking abilities needed to adapt to the world of the future (Cohen 1987g)?

## Our Attitudes Toward Creativity

A major barrier to creativity in the schools is our distrust of both the creative person and the creative process. We often have stereotypes of the creative person as either a rather unwashed individual who slings paint on a canvas, stomps about in it in bare feet, and lives a Bohemian existence, or as a mad scientist chuckling to himself as he invents some gene-spliced mutant monster. The fact is, however, that most highly creative persons lead very serious lives deeply committed to solving problems and finding answers, and then investing a great deal of thought, time, and energy in their pursuit.

The creative process also frightens us. In earlier times, creativity was thought to be related to mental illness. Freud, for example, related creativity to neurosis. More recent thought on the matter indicates that creativity is a sign of mental health. Nevertheless, the creative process has a scary aspect: the need to relinquish control. One has to allow the free flow of ideas from the unconscious or preconscious into the conscious, as well as to stay open to possibilities from the outside.

This does not mean that creativity requires no conscious effort. On the contrary, creative people work very hard over long periods on topics or problems of interest to them. But they also stay open to their "inner voices" as well as to events in the external world.

Can we accept children who may think differently from the way we do or whose interests and involvements are not like everyone else's? Can we accept in ourselves the duality of both purposeful effort and the necessary "letting go" to find our own creativity?

## A National Concern

Molotsky (1988) describes the current crisis in the United States concerning the quality of both our products and processes. He notes the steep decline in the number of U.S. inventions, stating that in the last twenty years foreign nationals have secured 45 percent of the U.S. patents, a drop of 20

percent in U.S.-based patents. He cites Tom Peters' new book, *Thriving on Chaos*, which looks at how other countries view U.S. products. Only 6 percent of individuals in countries surveyed thought that the U.S made quality products. Lamenting the fact that 45 percent of all graduate students in U.S. universities in the fields of engineering, math, computer science, and physics now are foreign students, Molotsky questions where all our inventors have gone. He also cites a lack of creativity among our Ph.D's, stating that quality instead of quantity must be stressed.

Molotsky believes that the solution to these problems is to develop programs for all children to stimulate creativity and invention and to encourage the integration of inventive thought in all school subjects, not just science. To this end, he suggests having "Invention Conventions" in which children invent solutions to simple or complex problems and share these with peers.

To overcome some of these barriers and to deal with our national problem requires the supporting of creativity, thinking, and interest development in the classroom. The next three chapters examine the nature of creativity, thinking, and interests, respectively, toward the goal of outlining, in the final two chapters, strategies for implementing these areas.

*Chapter Two*

# A Continuum of Adaptive Creative Behaviors

Before we can work at avoiding the barriers mentioned above, we must define creativity, understand how it relates to thinking and interest development, and determine whether or not it is inherent in all individuals.

## The Difficulty of Defining Creativity

Although *creativity* has been defined in a great variety of ways, many conceptions suggest that creativity involves the production of something new or rare that has value in the world (Rothenberg and Hausman 1976). This kind of definition, however, can only be applied to adults, since children are unlikely to produce something truly new or something that is valued by people who are not members of their family or peer group. Consequently, this definition is not very helpful to us, as we are concerned with creativity in the classroom.

Another definition of creativity focuses on divergent thinking. In this view, *creativity* is "the generation of information from given information, where the emphasis is upon variety and quantity of output from the same source" (Guilford 1967). This definition is widely used in classrooms, and while it initially appears to span the gap between childhood and adulthood, upon closer inspection it has two inherent problems.

The first problem is that highly creative people rarely use divergent thinking. Rather than generating many ideas, their concern is with the correctness and appropriateness of ideas and their social relevance (Gruber 1982a, b; Keating 1980; MacKinnon 1978). The second problem is whether divergent thinking tests predict real life creativity. Although such tests do seem to measure divergent thinking abilities taught by several major creativity training programs (which happen to be based on divergent thinking), there appears to be little relationship to creativity in the real world (Getzels and Csikszentmihayli 1976; Gough 1961; Howieson 1981; MacKinnon 1961; Mansfield, Busse, and Krepelka 1978; Renzulli 1979). Thus, divergent

thinking does not encompass the creativity of children and that of mature, eminent creativity. In fact, no definitions of giftedness or creativity make the bridge between forms of creativity expressed in both childhood and adulthood (Siegler and Kotovsky 1986).

## A Continuum of Creative Behaviors

That there are different types or levels of creativity has been recognized. For example, Taylor (1975 suggests a hierarchy of creative levels ranging from "expressive" to "emergentive" creativity:

1. *expressive creativity*—the development of a unique idea without concern for quality
2. *technical creativity*—proficiency in creating quality products without expressive spontaneity
3. *inventive creativity*—ingenious use of old materials in new ways, culminating in novel and useful products, but not representing basically new ideas
4. *innovative creativity*—ability to formulate departures from established schools of thought, such as Kris building on Freud's theory
5. *emergentive creativity*—a rarely attained level of excellence that incorporates very abstract ideas, principles, or assumptions that underlie a body of science or art

Tannenbaum (1983) suggests that creativity derives from four basic types of talents:

1. *Scarcity talents* are always in short supply and are needed to make the world safer, easier, healthier, and more intelligible, such as the talents of Jonas Salk, Martin Luther King, or Jean Piaget.
2. *Surplus talents* include individuals with abilities capable of beautifying the world, but not necessary to its survival, such as Pablo Picasso or Emily Dickinson.
3. *Quota talents* are a limited number of specialized, high-level skills needed to provide goods and services without major creative breakthroughs, such as doctors, teachers, engineers, or business executives. The need for quota talents is based on both demands and cravings.
4. *Anomalous talents* demonstrate how far the powers of the mind and body can be stretched, yet not be considered excellent, including prodigious feats or amusing actions. Examples are super rapid math calculation, mastery of trivia, or trapeze artistry.

Neither Taylor's nor Tannenbaum's categorizations take into account creativity in childhood, however.

One way to bridge the gap between childhood and adult creativity is to

adopt a developmental view, thinking of creativity as a range of adaptive behavior along a continuum. Figure 1 presents seven categories of creative behavior, ranging from learning something new to transforming a field.

**Learning Something New**

As displayed in the figure, the left pole of the continuum is level 1, *learning something new: universal novelty*. This type of creativity is expressed in all infants and children as they attempt to deal with novelty in the world and adapt to their environment.

Experienced as insight, this kind of creativity remains in those individuals who are able to stay open to the world, curious, joyful in pursuit of interests, and tolerant of disequilibria (imbalances to their systems). We see it in ourselves when we attempt to master a new field, for example, when we "get the hang" of side-stepping up a slope the first time we ski or when we grasp the theory of a perfect souffle. It is our own construction of the relationships in getting up a slope or keeping the eggs puffy.

We can call this Level 1 end of the continuum "creativity in the small" (Heller 1979) or "mundane creativity" (Dehn 1983). Its adaptive function serves to help us modify ourselves when we try to assimilate aspects of the environment that do not fit our existing systems of knowing. The construction, which usually remains in the realm of thought, is of value to the individual. We recapitulate our culture in level 1 creativity, as all new learners who mastered any concept or field had to construct the same notions for themselves—new to the learner, but not to the field. Level 1 creativity is therefore an ontogenetic process, having to do with the individual's development.

**Transforming a Field**

At the opposite end of the continuum is level 7, *creating by transforming a field*, a level of creativity found only in a few—those society labels geniuses. It is the type of creativity that revolutionizes a field or creates a new one by combining aspects of different areas of endeavor so that it is passed on to new learners in its transformed state, resulting in a paradigm shift (see Feldman 1982). At this level, the individual constructs a frame of reference with a unique point of view and transforms the world in which he or she works to accommodate that point of view (Gruber 1981a, 1982b).

When one can impose one's ideas on the world and the world changes in response, one is in control, can anticipate possibilities, and is highly adapted. The product, developed over long periods with many insights along the way, is highly valued by both those inside and outside the field. It is an adaptation of the world to the individual rather than the individual to the world. Society is changed by such creative efforts. The culture of the human species is transformed—a phylogenetic change—so that, as Feldman (1982) notes, the new learners in that field master it in its revised state.

In between levels 1 and 7 are stages that bridge one level to another.

Figure

# Continuum of Adaptive

**Degree of Novelty and**

***Infants and All New Learners***
***Individual Benefit*** ←

| Levels | *1. Learning Something New: Universal Novelty* | *2. Making Connections That Are Rare Compared to Peers* | *3. Demonstrating Talents* |
|---|---|---|---|
| *Definition of constructions or products* | The individual constructs relationships new to him or her but not to the world. Everyone who learns that field must make the same constructions, which remain in the realm of thought. | The individual develops products, ideas, or approaches that are unusual or rare compared to peers, but are not new to the world. | The individual develops products, skills, or ideas in a particular domain that are rare compared to age peers, but are not new to the world. The child becomes a craftsman.[6] |
| *Value* | The construction is of personal value. | The construction is of personal value, but may be seen as interesting or charming by others. | The product may be highly valued, particularly by peers and parents, perhaps as an anomaly, as seen in prodigies. |
| *Examples* | The tot constructs the idea of number—that four objects means 1,1,1,1 always; the adult discovers the rule for a perfect soufflé. | A four-year-old "invents" the idea of a stencil from cutting folded paper; a second-grader finds an unusual way to solve a math problem. | A ten-year-old produces an elegant poem or story; an eleven-year-old plays a Mozart concerto with a major orchestra; a three-and-a-half-year-old makes exquisite Lego constructions with materials designed for nine-year-olds. |
| *Characteristics of the creator* | Curiosity and pleasure in novelty. Play is important. | Inventiveness and originality —a fresh way of looking at the world. Autonomy—must find own way of solving a problem. Flexibility. Pleasure in the activity. Rich fantasy play. | A compulsion to work in an area of interest; drive for mastery; self-directed willingness to commit long hours of practice or effort. |
| *Structural aspects* | Modifies the internal structure to adjust to contradictions in the environment through simple assimilation and accommodation. | Assimilates disparate elements to schemes[4]; playful assimilation without accommodation. A trying out of new possibilities before accommodating reality. Attempts at coordinating schemes. | Vertical scheme extension.[1] Wide-Active Inference—the interest is applied to every new experience so that it is assimilated to a variety of schemes.[4] Other systems, such as affect and purpose, become integrated.[2] |
| *Speed* | Rapid—seconds to hours. | Usually rapid. Often seen repeatedly in a variety of endeavors. | Ongoing and developing —a constancy of effort. |
| *Results/Implications* | "Aha!" The insight experienced in constructing relationships between objects or ideas. Novelties constructed are universal: done by everyone. | Products, ideas, or approaches, coming as spontaneous insights, are rare compared to peers but not new to the world. Adults may become aware of child's unusualness or may be threatened by child's refusal to conform to the "right way" of doing things. | The child's talent must be recognized and given support, with appropriate lessons, materials, family focus.[1] A crisis may occur in teens when intuitive and figural ways of knowing meet formal logical thought.[5] |

References: 1. Feldman 1982 2. Gruber 1981 3. Renzulli 1977 4. Heller 1979 5. Bamberger 1982 6. Feldman 1980

1

# Creative Behaviors

**Value to the World**

→ *Extraordinary Adults Society Benefit*

| *4. Developing Problem-Solving Skills* | *5. Producing Information* | *6. Creating by Extending a Field* | *7. Creating by Revolutionizing a Field* |
|---|---|---|---|
| Through instruction, the individual develops alternatives and thinks flexibly, fluently, originally, and elaboratively; makes transformations; uses critical thinking; systematically uses problem-solving processes in a variety of subject areas. | The individual investigates problems that are real to him or her, producing new information,[3] but of limited scope, in areas of new interest and developing knowledge. | The individual adds something new to a field of endeavor that he or she has mastered, thereby extending it.[1] | The individual reconceptualizes and revolutionizes the field in which he or she functions or creates a new field by combining aspects of different enterprises[2] so that it is passed to new learners in its revised state.[1] |
| The product may be of limited value to others. | The product is of value to others in a limited arena. | The product is valued especially by those in the field. | The product is greatly valued by both those in and outside the field. |
| A group of middle school students design a landscape for a small school courtyard; businessmen investigate ways to make toothpaste more appealing to children. | A high school student discovers the pollution sources of a small creek; a sixth-grader writes a child's consumer guide to the stores in her town. | An individual designs a massive sculpture for the foyer of a public building; a doctor invents a new procedure for an operation. | Piaget's theory about how children think; or Darwin's theory of evolution. |
| Solving problems, usually suggested by others, often in a group setting. Can move toward self-set investigations of problems real to individual.[3] | Individual pursuit of a "burning question" with purpose, zeal, and commitment, after building up a considerable knowledge base. The involvement begins to change the way the individual views the world. | Problem finding. An awareness of a gap or need in the field and a need to work on it. A commitment to create. | Vision of the possible—an awareness of what could be done and a total commitment to create. |
| Puts things into relationships, using reflective abstractions. Coordinates schemes and subsystems yielding reciprocal equilibrations. | Puts things into relationships, using reflective abstractions. Coordinates schemes and subsystems (reciprocal equilibrations.) Systems of affect and purpose are involved. | Developing a frame of reference. Results in a partial type 3 hierarchical equilibration of totalities. Systems of affect and purpose involved, all systems functioning together to purposefully create. | Frame of reference completed with unique point of view.[2] Type 3 hierarchical equilibration of totalities completed. Sees relationships among disciplines—universal becomes universality. Uses networks of enterprises, relationships among diverse areas of interest.[2] |
| Hours, days, or at most, a few weeks. | May take weeks to several months. | Usually takes long periods of time and involves leading a creative life.[2] | Takes many years[2] and involves living a creative life. |
| Solution to problems, usually of short duration, and often through using heuristics. Teaching strategies for solving problems are useful. Recognizing different approaches to solving problems and developing control over selecting procedures to be used should be stressed. | Solution to problems real to, and selected by, the individual. New information within a limited area of domain is developed. Problem-solving heuristics are exercised, as the individual finds his or her own way of working through the problem. | Intraparadigm creativity. | Inter- or extra-paradigm creativity, resulting in a paradigm shift. |

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### Making Rare Connections

In level 2, *making connections that are rare compared to peers*, the individual develops products, ideas, or approaches that are unusual compared to peers but are not new to the world. Such efforts are valued by the individual and may be considered interesting or charming by others.

The four year old stops her preschool class on a city walk to focus on a pile of broken glass. "Look, here is a city with all the buildings and busy people. And see this piece? (pointing to a single fragment) This is a lonely child." This child sees the world in a fresh, open way, different from most children her age. Elements not ordinarily associated are assimilated to schemes (for example, glass fragments to a city scheme), or there may be playful assimilation without accommodation, a trying out of new possibilities before accommodating reality.

In an adult, this form of creativity might be evidenced in the making of an image metaphor to understand complex material. To grasp Piaget's concepts of structure, equilibration, and reflective abstraction, for example, he or she might play with such images as the construction of a building or the making of a painting. Usually, the process is rapid, perhaps involving a few hours, and it is often demonstrated in a variety of areas.

Some adults may become aware of and appreciate the child's uniqueness, whereas others may be threatened by the child's refusal to conform to the "right way" of doing things. For instance, a teacher may get into a power struggle with a second grader who has a different way of solving a math problem. When the child demonstrates making connections that are rare compared to others, the environment should be accepting of different ways of doing things. The child's inventiveness and autonomy should be encouraged.

### Demonstrating Talents

In level 3, *demonstrating talents*, the individual develops products, ideas, or skills in a particular domain that are rare compared to age peers, but not new to the world. The child becomes a craftsman, honing his or her skills and learning through various stages, acquiring the accumulated knowledge that has been developed over the history of a field (see Feldman 1980). The child may demonstrate talents in such areas as athletics, music, chess playing, mathematics, or writing. This category would also include the adult who is very good at something, such as auto mechanics or French cooking.

At times, a child's products or displays of ability may approach adult levels. The child who plays violin exquisitely with a major symphony orchestra at age 11, writes a moving story about the holocaust at age 10, or beats a world chess master at age 12 is considered a prodigy.

There is both vertical scheme extension as the interest develops and what Heller (1979) calls "Wide-active Inference." That is, the interest is applied to every new experience; violin playing is related to all new events, for example.

Level 3 is characterized by an overwhelming compulsion to work hard in the area of interest. There is great involvement and internal motivation, a

purposeful and joyful movement toward mastery or becoming good at one's field. Heredity and environment are inextricably bound together in this level of creative development. There is a "clicking" or "rightness of fit" between the individual and the field. The child has a genetically endowed capacity to be very good at something, but the environment must offer the opportunity and the support for that development to occur. The child's talents must be recognized and nurtured with appropriate instruction, materials, and family support to reach mastery levels (see Bloom 1985; Feldman 1980, 1986).

Even with such support, what appears to be remarkable in a child of ten may be more commonplace among sixteen year olds. The coincidence of historical and environmental factors must be exceptional for the young prodigy to become the mature artist or athlete.

Whether such children will become mature creators (levels 6 and 7) depends as well on the evolution of their systems of purpose (the intent to create) and affect, on environmental and historical factors, and on how successfully the young persons integrate an intuitive approach to the field with their evolving formal thinking. For example, Bamberger (1982), Gardner (1973), and Gilligan and Kohlberg (1978) point out that the transition to formal thought presents a crisis for adolescents who were very gifted or were child prodigies.

**Solving Problems**

Level 4, *developing problem-solving skills*, involves instruction in such strategies as developing alternatives; using fantasy and imagery; thinking flexibly, fluently, originally, or elaboratively; having remote associations; making transformations; using critical thinking; and systematically using problem-solving and problem-finding processes in a variety of areas. These are the techniques typically taught in creativity training programs, most of which are based on divergent thinking notions.

Mansfield, Busse, and Krepelka (1978) reviewed five major creativity training programs. In spite of their skepticism regarding the programs' value for developing mature creativity, they concede the programs can stimulate creativity at the nonprofessional level. Although results from these programs appear encouraging, Mansfield and his colleagues note that the tasks used to measure the success of the programs are too similar to the exercises in the programs themselves. I believe that the true value of such training may be more in developing a supportive environment for creativity, helping children to take risks by encouraging original answers rather than "right" answers, training them to think exhaustively about a topic, and providing a variety of techniques to consider in doing creative work.

Products developed through the problem-solving process may be of limited value to others, but, more importantly, the individual develops strategies and approaches for dealing with novelty. For instance, a group of middle school students, with the help of their teacher, designs a landscape for a small school court yard; or businessmen work with a facilitator to find ways to make

toothpaste more appealing to children. Usually, solving problems in the learning setting involves problems suggested by others, often but not always in a group situation. Such activities can lead participants to investigate problems of their own choosing at the next level, producing information (see Renzulli 1977).

The individual must put things into relationships, using reflective abstractions, a mechanism described by Piaget (1977a) for dealing with novelty in thought. Schemes and subsystems are coordinated resulting in reciprocal equilibrations, an action akin to combining parts of two machines to create a third with a new function. Usually the duration is hours or days for a given problem, and rarely a few weeks.

Problem-solving (level 4) and mature creativity (levels 6 and 7) are different in both duration and effect. Problem-solving is a short-term process, whereas creativity at these higher levels is lifelong. Gruber (1982b) finds that this type of creativity, unlike problem-solving, involves the construction of a point of view.

Both creativity and problem-solving share a common starting point—incongruity in a problem. Both require knowledge, motivation, repetition, and the finding of unique combinations. However, mature creativity differs from problem-solving not only in the development of point of view but in time needed for solution, the impact of the product on the world, and the fact that level 6 or 7 creativity involves a larger unit of analysis, focusing more on a totality rather than on a specific answer. In addition, problems to be solved are usually externally set in problem-solving, whereas the mature creator both identifies and solves the problems.

As important as problem-solving strategies is *metacognitive awareness*—that is, awareness of one's own mental processes (see Brown 1978; Costa 1984, 1985a; Carr and Borkowski 1987; Flavell 1976; Jones and others 1987; Katz 1983; Shore and Dover 1987; Sternberg 1985). The individual needs to recognize different approaches to solving problems as well as his or her own particular strategies and styles. He or she must gain control over which procedures to select for which problems (see John-Steiner 1985).

### Producing Information

Level 5, *producing information*, is characterized by the investigation of problems identified by the individual in areas of interest and developing knowledge. Through the process of investigation, the individual produces new information of limited scope (see Renzulli 1977, Tannenbaum 1983). A fourth grader goes beyond *consuming* information (using what others have produced) from an encyclopedia article on cats to becoming a *producer* of information by keeping a careful log of weights, measurements, behaviors, and daily photographs for six weeks of the changes in her cat's litter of kittens. A high school student discovers the source of pollution in the small creek behind his house. A sixth grader writes a child's consumer guide to the stores in her town. A twelve year old, deeply moved by the plight of the

homeless, singlehandedly rallies a community to help.

At this level, the individual pursues a "burning question" with purpose, zeal, and commitment, while building up a considerable knowledge base. The involvement begins to change the way the individual views the world. In addition to the reciprocal equilibrations and reflective abstractions seen in level 4, the systems of affect and purpose become involved in an all-consuming focus on the problem. The product may take several weeks or months to develop. Problem-solving heuristics are exercised, but the individual begins to find his or her own way of working. The product is of value to both self and others, though the scope is likely limited to an arena "close to home."

The individual is beginning to impose his or her views on the world. Adaptation begins to shift from making self fit the world to changing the world a little by one's ideas and efforts.

**Extending a Field**

What most people consider creativity—production of something new or very rare to the world that is of value—is reserved for the last two levels on the continuum. We can refer to these types of creativity as "mature creativity" because they involve well-developed systems and thorough mastery of a field.

In level 6, *creating by extending a field*, creators add a new dimension to a field. Having mastered a field in order to be aware of its gaps or needs, the creator is internally motivated to create a solution (Feldman 1980). This level of creativity remains within a paradigm. A partial point of view is constructed. Support for levels 1 through 5 can lead to this level of mature creativity.

## Support for Creativity

Clearly, not only the talented and gifted, but all children, need support for their creativity, because creativity is an aspect of every act of real learning. Although not all of us may attain levels 6 or 7, we can enrich our world by developing a memorable lesson, catalyzing a school's sense of unity, or creating a school where all persons in it—teachers, children, the custodian—are empowered to be the best they can be. And we can create a classroom environment that supports making connections, having insights, and deriving pleasure from learning new things.

We can recognize and encourage the child who, in comparison to his or her peers, does unusual things, by supporting the child's engagement in areas of interest. We can also teach children how to solve problems, nurture the development of talents and interests, and help children to become producers instead of consumers of information.

By moving up the continuum of adaptive creative behaviors through classroom activities, we may be able to bridge the gap between the universal creativity seen in all young children and the mature creativity that extends a field or even revolutionizes a paradigm. And by supporting creative

development in childhood, we can help more children become mature creators, benefitting both themselves and society.

Clearly, current tests for creativity do not begin to get at the complexity of the creative process. At best we can isolate a few behaviors and see whether or not a child has them. If we consider the continuum of creative behaviors, however, we can begin to think of creativity as a developmental phenomena with certain levels that can be operationalized for observation purposes so that we can determine where a child fits along the continuum.

We must remember that creativity rests on interests. If we give a child a test that asks her to make remote associations between three words (for example, Mednick's Remote Associations Test), and she does poorly, we must ask whether she was interested in the task before assuming she is not creative. Asking her to make up her own remote associations and justify her answers may be far more interesting and engaging to this child. Observing the child in her naturally selected involvements may also be far more effective. The next step for researchers and curriculum developers would be to take each level of the continuum and operationalize it perhaps with a checklist of observable behaviors.

*Chapter Three*

# Thinking and the Creative Process

Thinking is a very important aspect of the creative process. We must teach children to think because our very lives depend on it. If we are to solve the problems of pollution, nuclear war, racial and religious hatred, and the many other areas that compete for our attention, we must help children to become thinkers.

Thinking is the way we exercise intelligent human behavior (McTighe and Schollenberger 1985). It is the mental manipulation of sensory input as well as thoughts about thought to formulate new ideas, reason about, or judge (in part from Costa and Presseisen 1985). According to Seiger-Ehrenberg (1985), thinking is essential to all school subjects. It is required as a lifelong learning skill to deal with the ever-expanding fields of knowledge, and is essential for adapting to the world of the future.

Piaget (1980a) describes intelligence as adaptation. By this he means that intelligence, which in humans over about age 2 is exercised as thinking, allows the individual to modify his or her structures of thought to deal with conflicting and novel elements in the world. We have already described the continuum of adaptive creative behaviors in which we see that adaptation has been extended to a broader notion: the individual can make the world of endeavor adapt to him or her, thereby gaining greater possibility to anticipate and control his or her environment. Thinking is the mechanism of such adaptation.

## For, Of, and About Thinking

Costa (1985b) states that we must teach ***for*** thinking by the following means:

- setting a climate for thinking by training teachers to pose problems, raise questions, and model thinking behaviors
- structuring the environment by valuing thinking, allowing time for it,

providing materials, and evaluating growth
- responding to student ideas in ways that create trust, permit risk-taking, and support experimentation and creativity
- remaining nonjudgmental
- having students share and listen to each others' ideas

We must teach ***of*** thinking, Costa says, by developing a repertoire of thinking strategies such as TABA's inductive thinking methods, Suchman's Inquiry Strategies, Whimby and Lochhead's Paired Problem Solving, Gallagher's Questioning Grids, Guided Design, Feuerstein's Instrumental Enrichment, Ennis's Critical Thinking, or DeBono's Lateral Thinking. These can be used to elicit particular kinds of thinking at appropriate times.

Finally, he says we must teach ***about*** thinking by studying famous thinkers, by learning about the physiology of thinking, through brain study, and by studying our own metacognitive strategies. There is not space in this Bulletin to describe either the models or the metacognitive strategies in any depth. An excellent sourcebook for such information is A. L. Costa (ed.) (1985a), *Developing Minds: A Resource Book for Teaching Thinking*, published by the Association for Supervision and Curriculum Development.

## Relationship Between Thinking Skills and Creativity

Teaching for creativity and teaching for thinking are parallel processes. What has just been said about thinking can also be said about creativity: we teach *for* creativity, creating a classroom that invites and supports its development and the development of talents; we teach *of* creativity, helping children develop skills in the use of a variety of problem-solving strategies, imagination and imaging activities, and the production of information; and we teach *about* creativity, having children study the lives of famous creators, how the mind works, and their own creative processes. When we teach for, of, and about thinking, we can also teach for, of, and about creativity by extending the notions a little.

In the continuum of creative adaptive behaviors, we saw that creativity is involved in all acts of learning, as novelty must be constructed by the individual. This constructive process involves thought, or action in the mind, past the period of infancy. In fact, to develop mature creative individuals, we must develop excellent thinkers. Creativity, however, is a larger set, involving more than rational-logical thought implied in thinking skill training. Creativity involves other systems as well: the systems of universal knowledge, nonuniversal knowledge, affect, purpose, and the physical and perceptual systems. All these systems interact in the process of creativity.

### Interactive Systems

An Interacting Systems Approach (Cohen 1985) supplies the needed dynamic for seeing these relationships. Several systems are involved in

creativity (see Gruber 1981a), as follows:

1. *Universal knowledge* —This is the set of rules and laws constructed by all children in all cultures that underlie all knowing, such as classifying or seriating.
2. *Nonuniversal knowledge*—This refers to domains where the individual displays special competence beyond that which peers demonstrate, such as ability to play the piano, carve wood, conceptualize mathematically, or write poetry (see Feldman 1980).
3. *A system of affect* —Included here are the motivations, emotions, and values that support sustained creative effort in the face of difficulties.
4. *A system of purpose*—In the adult, purpose refers to the intent to create; in the child, purpose revolves around the big questions that become quests, then themes in making sense of the world.
5. *Physical system* —For the child, the physical systems (the body and its functioning) play a more important role in creative development than they do for the adult. Aspects of the physical system are one's control over one's body, self-image, physical ability to accomplish one's goals (paint a horse that looks like a horse, for example), and one's physical well being as well as one's neurological development.
6. *Perceptual system* —This system has to do with how one uses the senses to interpret the world. This system also may be more important in the child. One's learning style is related here, as is one's sensitivity to noise, light, and so forth. Aesthetic awareness is an aspect, as well.

Creativity involves interactions of all these systems directed by the system of purpose toward a product and the development of a point of view. Figure 2 portrays these systems as interacting spirals built around purpose vectors (arrows). The universal knowledge system is combined with the physical and perceptual systems to simplify the figure. They are shown as the large spiral making four major turns to represent Piaget's stages. This large spiral evolves within an "envelope" of social and physical interactions.

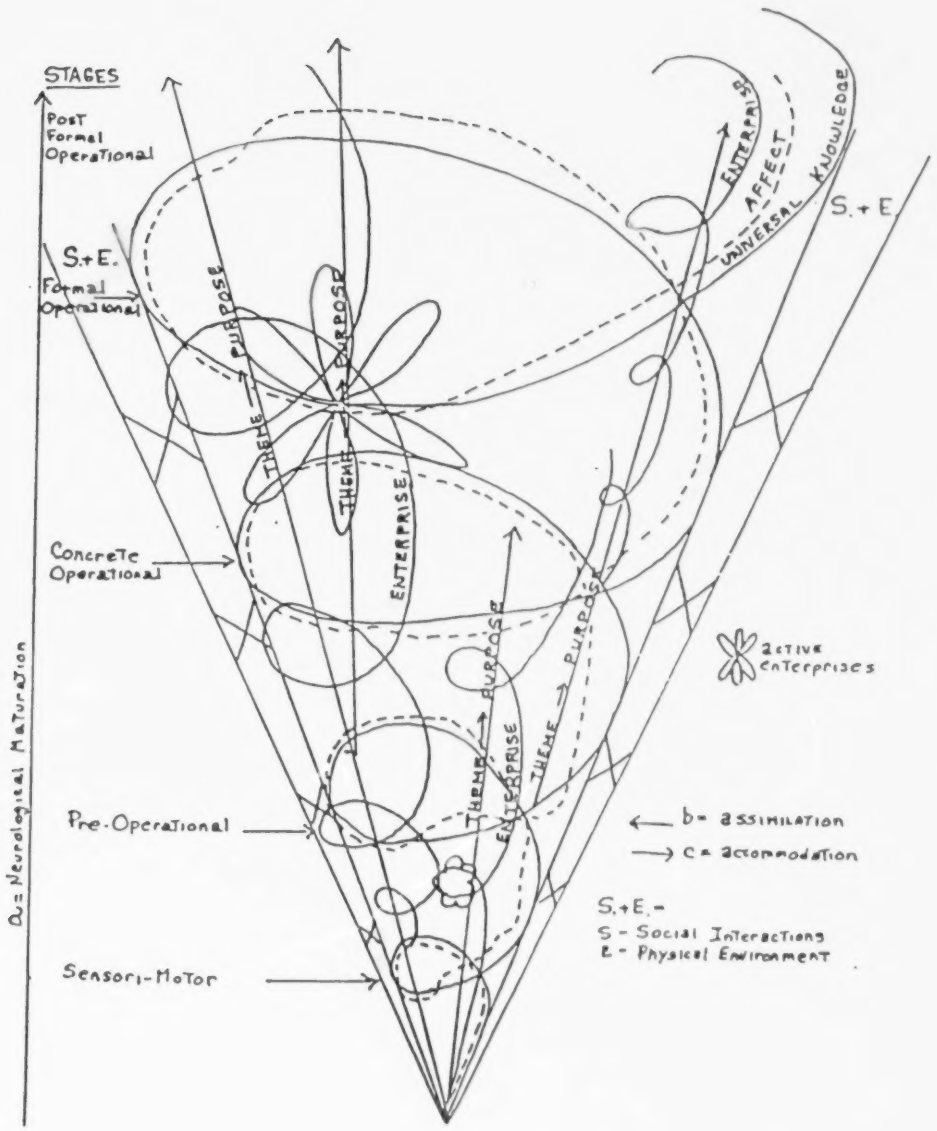
Generally parallel to this combined universal knowledge system is the system of affect, represented as the dotted line that sometimes diverges from and sometimes crosses the universal system. Nonuniversals are drawn as smaller spirals surrounding purpose vectors, called enterprises on the figure because to develop nonuniversal domains requires interest involvement. Active enterprises, areas of intense endeavor and productivity, are seen as florescences. Maturation is the vertical arrow outside the figure. Schools must support the growth of all these systems, not just the development of knowledge, for creativity to evolve at high levels. Clark's (1986, 1988) Integrative Education Model is a good starting point.

### Languages of Thought

In addition to these general systems involved in creativity, different

**Figure 2**

## The Interacting Spiral Model of Creative Development



thought processing systems, which John-Steiner (1985) calls the "language of thought," are productive in assisting thinking, learning, and creating. These processing languages are the verbal or semantic mode (thought in words), the figurative or iconic mode (thought in images), the symbolic mode (thought in symbols or abstract representations), and the behavioral or psychomotor mode (thought in actions) (see Bruner 1973, Guilford 1967). For example, Alesandrini (1985), Ernest (1977), and Marschark (1983) state that using images (figurative or iconic mode) helps students learn, and Clark (1986, 1988) finds that physical enactment of concepts (behavioral or psychomotor mode) is beneficial for understanding and remembering.

**Modes and Metaphors**

I have students use externalized images to help them synthesize difficult information as well as to become aware of their own thought processes (Cohen 1987h). Active construction is required to integrate verbal information from the text into an image rather than learning it only for a test and immediately dumping it. Active learning, a creative act, appears to require a metaphoric process. Bateson (1980) states that *metaphor* is "the main characteristic and organizing glue of this world of mental process." It appears that either we must construct an analogic metaphoric relationship to link new material to the familiar (see Gordon 1971; Prince 1970, 1977) or we must transform the mode in which we process material from that in which we acquired the information (also a metaphoric process).

If we are learning how to ski and we have a bad spill, for example, we use verbalization or imagery to help us grasp the problem. If we are working with math symbols to solve problems, we can express the problem in figurative images, verbalize the material, or use physical configurations to understand the problem.

To grapple with complex information, we must transform it from a verbal mode to images, symbols, or actions. As a heuristic for encouraging children to learn, we suggest helping children learn to switch modes as well as asking them to construct metaphors to relate the new material to what they know.

By teaching for, of, and about both thinking and creating; supporting cognitive growth as well as the development of affect, purpose, perception, and physical systems; and by teaching children to use both mode-switching and metaphor strategies in thinking and learning, the potential for creativity is enhanced.

*Chapter Four*

# The Development of Student Interests

Creativity (and all learning) is based on interest. One creates in a field, in an area of interest (Feldman 1980). In this chapter I explore the importance and development of interests in the child.

Piaget (1970c) stated that *interest* is the dynamic aspect of assimilation when the "self identifies with ideas or objects, when it finds in them a means of expression and they become a necessary form of fuel for its activity." In other words, interests are engaging to a child because they help to restore equilibrium or balance as well as energize activity. Piaget noted that interest controls intellectual functioning, helping the child to build structures and wholes. Thus, interests have a very important adaptive function.

## Types of Interests

Research has led us to distinguish two major types of interests (Cohen 1987c). One type of interest (I shall call it type 1) is expressed when a child deals with a novel situation—a new toy, a new way to check long division, a new spelling game, a new bulletin board. We know from many studies that children seek novelty and thrive in environments where moderate novelties (not too foreign, not too familiar) are offered. We also know that such novelty stimulates brain development. This type of interest is stimulated by environmental events that are puzzling to the individual and serve to focus attention and energy. It is an adaptive function of the organism, supporting level 1 creativity.

Teachers can utilize the principle of moderate novelty to maintain interest in the curriculum. By varying approaches to dittos or worksheets, finding alternatives to the same old math drill, or adding a game to what is too often repetitive spelling work, the novelty is maintained and the interest in the subject is heightened instead of reduced.

A second type of interest, also found in very young children, is more

closely related to the creativity in mature individuals. Type 2 interests are operationally defined as having the following characteristics:

1. Involvements that endure over a long period (two months or more) in a child over twenty-four months. In a younger baby, one month is sufficient.
2. Characterized by intensity of attention (one hour or more per day, but not necessarily in a single block of time) and an unwillingness to leave the activity when engaged (may be less in child under two years).
3. Focus on questions or problems (not necessarily expressed orally—these must be inferred, especially in the preverbal child), with a willingness by the child to tackle difficulties.
4. Expanding—the interest extends to ever-widening areas and results in the development of infantile expertise.
5. Permeable to other areas of life.
6. Fantasy life focuses on the interest (after about age 2).
7. Characterized by pleasure and excitement in the child.

## Interests as the Seeds of Creative Development

For several reasons, type 2 interests in the very young child are hypothesized to be the seeds of creative development (Cohen 1987a, b, c, 1988). Gruber (1973) stated that children's "thinking, like Darwin's, is 'childlike'—questioning, searching, following unexpected leads, inventing, discovering. Their thinking is creative, especially when it is permitted to function freely and is respected as all such thought ought to be."

Tied to interests, we find that creators are involved in a specific field of great and compelling interest to them, just as certain interests are compelling to a baby. Babies and creators pursue their interests in a similar way, spending much time on them and expressing zeal and joy in their pursuit. Both have uncensored openness to life experiences. And both little children and highly creative people are motivated by a gap, a discrepancy, a contradiction—in short, a disequilibrium.

The differences are that in the child the novel constructions are new to him or her and perhaps unusual compared to peers, but are not new to the world. The nature of the reflectivity is based heavily on empirical events, and there is a very incomplete structural base from which to work. While the adult creator has a vision of the possible to help set his or her purposes (the intent to create), the young child has a quest impelled by disequilibria deep within and among the systems. For example, the child may have a passionate interest in Superman, big road-working machines, or monsters, or she may desire to conduct an orchestra. All these examples are interest expressions of one bigger quest or theme: to be in control of oneself and this strange and sometimes dangerous world.

Feldman (1980) views creativity as occurring within a domain. In his Universal-Unique Continuum, depicted in figure 3, one must be at the idiosyncratic level of a discipline before one can be truly creative.

**Figure 3**
**Universal-Unique Continuum**

| *Universal* | *Cultural* | *Discipline Based* | *Idiosyncratic* | *Unique* |
|---|---|---|---|---|
| Spontaneous acquisition | Domains in a culture all are supposed to acquire but do not necessarily; e.g., writing, reading | Mastery of a particular discipline | Subareas of a discipline mastered by a few. Expertise or mastery in a special way | Achievement never done before that results in important new contributions to bodies of knowledge |

Source: Feldman 1980

To master a domain or discipline at the idiosyncratic level, one must commit oneself to it and have a great interest in it. The tot's great passion for puzzles or fire engines is the beginning of such commitment. The content of the interest may be different in the adult, but the adult's sense of purpose may be fueled by the same theme seen in the baby.

An extraordinary level of interest is exhibited by the prodigy, the child whose mastery of a field approaches adult levels of competence. Examples are the fourteen-year-old gymnast who wins the Olympic gold medal or the thirteen-year-old mathematician who could get straight A's in Harvard's graduate math program. Such children would be categorized on the Creativity Continuum of Adaptive Behaviors at level 3, *demonstrating talents*, though such extraordinary feats mark the prodigy as most unusual even on this continuum. In each case, the child is so attracted to an area of interest that huge amounts of time are invested, as well as much parent support and appropriate and excellent instruction (NOVA 1985). It is clear that interest is critical for such advanced development. Math, chess, music, and athletics are fields where such prodigious development occurs. It is very rare or nonexistent in fields such as philosophy or nuclear physics, where the levels of complexity or technical mastery to begin to be productive require greater experience and maturity.

Whether the prodigy becomes the mature transformational creator depends on a delicate confluence of factors: the content of the field and its level of development; the coincidences of time and place; the context of history and geography; and the catalysts of family, mentors, friends, and teachers (see Bloom 1985, Feldman 1982, Simonton 1979, Walberg and others 1981). It may also depend on whether the individual can be described as having a linear

trajectory (that is, staying within one's field only) or having a breadth of involvements. We shall explore this issue a bit later in this chapter.

## The Structuring of Interests

In my longitudinal observations of interest development, I have found that young children's type 2 interests often change. Some children pursue one area intently for a while and then move to another, while others work on several interests at once. In these changes, we have found that there is a pattern or structure, rather than random jumping from one involvement to a completely different one. Interests are structured around *themes*, which are the core, the constant and recurring motif that gives coherence to the evolving interests (Ferrara 1984).

A brief description of one child's interest development from age 8 months through 11 years, 8 months demonstrates this structuring along two major themes, "action-power" and "putting it all together." I shall refer to him as "Mike" (not his real name). A newly emerging third theme, "friendships and morals values," began at about age 9. Figure 4 graphically depicts the progression of Mike's themes.

### Action-Power Theme

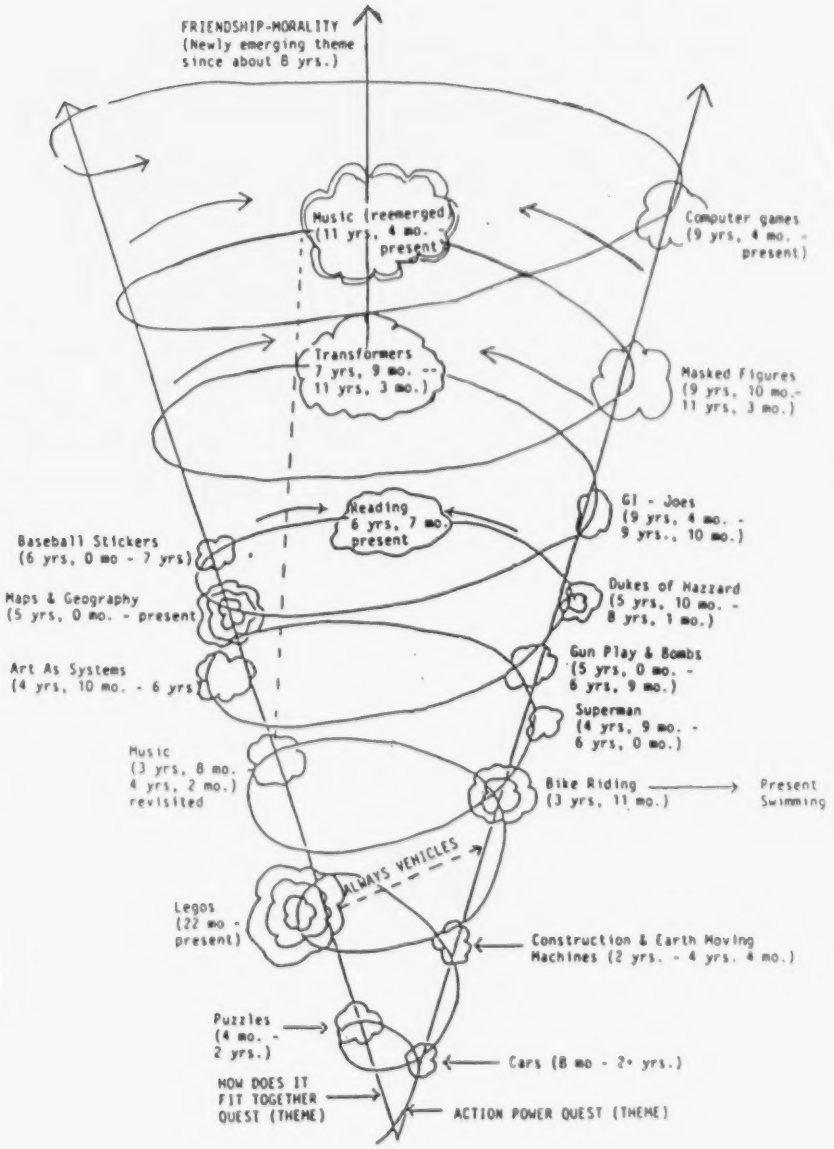
Mike's action-power theme began at eight and one-half months when he showed a decided preference for moving cars and other vehicles. By age 2, the interests became more focused on earth moving and construction equipment. A month before his fourth birthday, Mike learned to ride a bicycle, the action and power thrilling him. Superman fantasies at age 4 years, 9 months, gunplay at 5 years, and the Dukes of Hazzard TV program (5 years, 11 months) were the next action-power interests. At 6 years, 2 months, "M" learned to swim.

Through matching names and data on baseball stickers to corresponding blanks in his sticker book, Mike taught himself to read during the month of his sixth birthday. Reading coordinates both themes, "power and action" and "putting it all together." From age 7 to the present, Mike reads voraciously. In his questions, "Which animal eats the most for its weight?", "Which is the tallest mountain?", or "Can you name all the transformers in this set?" he is not raising questions for information, but is the one who knows the answers and feels power in demonstrating his knowledge. The quest has grown from an active orientation to more of a power orientation, and it no longer has to be physical.

From age 9 years, 4 months, through 9 years, 10 months, Mike was focused on GI Joes, small war toy figures and vehicles through which he could express power. Next, a variety of transformers (toys that can change form) that have magical powers such as flight or invisibility occupied his fantasy play. From 9 years, 4 months through the present, Mike has loved to

## Figure 4

## Interests and Themes of Mike



play computer games where he can control the little figures on the screen.

**Putting It All Together**

The other theme in Mike's development has been "putting it all together." This began at 11 months with a car puzzle. Puzzles for children through age 6 were his passion until his second birthday. At twenty-two months, he became involved with Legos, which soon replaced puzzles as his major interest. This toy above all others, with numerous additions, has been his great favorite to the present. Usually the constructions focused on vehicles, though more recently he has been designing his own transformers that change form with a few twists of the wrist.

An interest in orchestral music surfaced at age 3 years, 8 months. His concerns were with classifying the instruments, finding their ranges, and listening to their sounds in ensemble. In short, Mike's concern was "putting it all together." His art work also reflected this, beginning at 4 years, 10 months. Drawings of the household plumbing system and the workings of a whale, raven, and rabbit were typical.

Mike was interested in foreign languages, different kinds of people, exotic places. He loved studying maps and globes (beginning at age 3 1/2), putting the world together. Currently geography and social studies are favorite school subjects.

An interest that typifies both themes is a passion for transformers. From 7 years, 9 months through 11 years, 3 months, Mike was consumed with these toys that have great and often magical powers and can be put together in different forms. Mike enjoyed taking them and GI Joes apart with a screwdriver and putting them together with parts of other compatible figures, as well as transforming them in the standard way.

A reemergence of interest in music, beginning at 11 years, 4 months, also typifies both themes. Mike is playing in two bands, enjoying "putting sound all together" with other children. He wants to play every brass and woodwind instrument in the band, and he has spent much time getting control over his trumpet, as well as working on French horn, baritone, and saxophone.

His newly emerging theme, a great concern with friendships and relating to other children as well as morality, is emerging, perhaps as a theme of the pre-teen age period.

## Themes: The Pattern of Interests

As the preceding example illustrates, themes are major questions or quests around which one organizes one's interests, one's systems, and one's life in an attempt to make sense of the world and one's place in it. We hypothesize that themes arise from deep disequilibria or imbalances at the unconscious level among or within systems, compelling a quest. They are remarkably stable, whereas interests change. Themes give a pattern to interests and serve

as vectors or trajectories for interests' development.

### The Variations of Themes

Through my own observations of developmentally advanced young children, I have identified six major themes and their variations (Cohen 1987e): (1) control, (2) nature-nurture, (3) putting it all together, (4) people-relationships, (5) aesthetic-expressive, and (6) symbols and symbol systems. The actions of the child in his or her pursuit of an interest give clues, as does looking at interests over time as an ensemble. Most of the children studied demonstrate between two and four strong themes, though all children probably have a little of all of them. I hypothesize that these themes would be found in children with more typical developmental trajectories as well. The variations on each theme are listed below:

#### *Theme 1 Variations: Control*

1. *Control* —The child wants to be in charge of the self and the world, seen in such interests as being Superman or conducting an orchestra.
2. *Mastery* —The child practices gymnastics, a piece of music, or drawing a horse to perfect the skill.
3. *Action/movement* —Examples are playing ball, running, jumping, dancing, and other gross motor activities.
4. *Power* —The child is interested in objects of power, external to him or her, such as cars, volcanoes, or mask figures.
5. *Rules/order/limits*—The child is fascinated with the parameters, requirements, structure, and organization of things, events, and feelings.
6. *Adventure/exploration*—The child seeks opportunities to explore or adventure independently. "Leave me here in the woods; I want to explore" (girl, age 3 1/2).
7. *Independence/do it myself*—"I dood it myself!"; the child makes attempts at dressing, feeding, reading.
8. *Getting attention*— "Look at me, watch me!"; the child constantly calls attention to self.
9. *Experimentation*—The child sets up experiments and tries to prove her hypothesis; "When I leave these mushrooms in water, they will all turn blue."

#### *Theme 2 Variations: Nature-Nurture*

1. *Nature*—The child expresses a profound interest in plants, animals, and other aspects of the natural world.
2. *Nurture*—Caring for, loving, dressing. The child makes a habitat for the baby fish in the creek, dresses her cat, hugs and cuddles her doll.
3. *Belonging* —A concern with being part of groups, particularly families, is evident.

#### *Theme 3 Variations: Putting It All Together*

1. *Putting it all together* —The child is fascinated with puzzles, Legos or blocks, maps, and globes.
2. *Meaning/function of objects*—"What is it?" "What does this do?"
3. *How things work*—The child asks questions about things or takes them apart to figure out how they work.
4. *Relationships*—Here the attention is on cause and effect (not social), such as

interest in light switches and computer keys. "What happens if I hit two keys at the same time?"

5. *Origins*—How things begin is the focus of attention. "What was the very first seed?"
6. *Transformations*—The child plays with clay, transformer toys, costumes, and dressing up.
7. *Understanding world/life*—The child expresses interest in people and languages of different lands, life cycles, and so forth.
8. *Experimenting with objects*—"What happens if I put water in the gas tank?"

### *Theme 4 Variations: People/Relationships*

1. *People puzzles*—The child spends considerable time observing people and asking questions about their behavior; "Why is that man shouting at the lady?"
2. *People relationships*—The child is interested in relating to people and curious about family roles and relationships; "Who is Daddy's brother to me?"
3. *Being liked.*
4. *Friends/companionship.*
5. *Communicating*—The child is intent on getting his or her ideas across; "It's *my* turn to tell a story."
6. *Morality*—The child is concerned with good/bad; proper behavior; and world problems.
7. *Feelings*—The child asks often about how another feels; "Are you sad, Mommy?"
8. *Imitation*—The child likes to do what mommy or daddy does and enjoys sitting at his desk and working on his papers while mom marks tests.
9. *Roles*—The child takes on different roles, such as being Cinderella or the Big Bad Wolf.
10. *Helping people*—Examples are setting the table, offering to help with cooking, washing the car, helping grandpa cross the street.

### *Theme 5 Variations: Aesthetic/Expressive*

1. *Aesthetic*—The child expresses sensitivity to and delight in beauty and appreciation of the arts; makes subtle observations; demonstrates an openness to the world. A 2 1/2 year old says, "Mommy, see how the artist painted the shadow of the birds on the sand? How pretty it is!"
2. *Artistic expression*—The visual arts attract the child's interest.
3. *Musical expression*—The child plays an instrument, sings, conducts, dances, or listens to music for long periods.
4. *Expression (general)*—The child combines areas of expression such as art and song, acting, and expressive body movement.
5. *Sensuality*—The child revels in pleasures to the senses, such as rubbing a blanket over her cheek or delighting in tasting something.
6. *Expressing feelings*—The child lets his feelings be known (as opposed to interest in other's feelings) (see theme 4, variation 7).

### *Theme 6 Variations: Symbols and Symbol Systems*

1. *Cognitive skill acquisition*—The child works on learning about words, letters, numbers.
2. *Meaning/function (Semantic)*—"What does P-A-B mean?" "What does this mark (') do?"
3. *Representations*—The child is interested in how different languages are written and pays attention to images.

4. *Symbols*—The child inquires what symbols stand for, decodes symbols, or wants to learn different ways to say or write a word or number.
5. *Abstractions*—The child looks for mathematical or other symbolic or semantic relationships.

### Identifying the Theme

As can be inferred from the above list, the same interest may evidence different themes. We can identify the theme through studying the activity of the child, the fantasy play, and the questions (inferred or asked) in an interest over time. For example, many children are interested in animals, but this interest could actually evidence any of the six themes:

Theme 1—Control: Teaching the dog to sit; roll over.
Theme 2—Nature-nurture: Petting, hugging, cuddling pet; dressing it up; making habitats for it.
Theme 3—Putting it all together: Learning all about the members of the cat family, whale family.
Theme 4—People/relationships: (Unlikely here) perhaps how people look like/are like animals, or role playing; humanizing animals.
Theme 5—Aesthetic/expressive: Drawing horses; taking pleasure in color and beauty of birds or butterflies.
Theme 6—Symbology: Writing lists of animals, spelling names, reading about animals.

## Interests and Creativity

Interests are important to our understanding of creative development because they occur naturally and spontaneously. This is not to say that interests develop in a vacuum, but that the baby or young child selects from the environment he or she is offered and uses these interests in a free and joyful way to try to make sense of the world. Type 2 interests most directly reflect the interactions of heredity, the social milieu, and the physical environment at the point called the "center of action" (Cohen 1985), where disequilibrium occurs.

### Importance of Interests

The type 2 interests of a child are very important because they help to resolve inner conflicts, allowing the child to develop a healthy self-concept. Interests are a child's way of regulating the internal stresses and imbalances and working them out. It is essential that parents and teachers understand their significance and support their development.

If we expose children to new possibilities, facilitate their direct requests for help, find ways to extend their interests, and understand something of the deep questions the children are raising in their pursuit, they have the greatest

opportunity to develop in a manner unique to them and to resolve the questions being faced.

**Interest Trajectories**

Earlier in this chapter, I discussed Feldman's Universal-Unique Continuum. Feldman believes that great creativity can only occur when the individual has idiosyncratic mastery of a specific domain. For him, the revolution of a field occurs when a person has mastered that field in such a special way that he or she can make a unique contribution to it. This is a linear interest trajectory. But the question is, Where does the material for creative thought come from? If one works only within a single field, how do new ideas arise?

An alternative view is that of Gruber. In his studies of Piaget and Darwin (Gruber and Voneche 1977, Gruber 1981a), Gruber states that creativity results from the interactions of the systems of knowledge, affect, and purpose in a network of enterprises (areas of endeavor and interest in which one is usually productive). It is the networkings between and among these enterprises or interests that permit construction of novelty, a trajectory consisting of a breadth of involvements.

Darwin and Piaget both had multiple areas of involvement. Piaget, for example, studied certain mollusks and sedums and the notion of structure in a variety of disciplines such as mathematics and philosophy, as well as infant and child learning. Darwin and Piaget are examples of level 7 creators who have revolutionized their fields.

An issue (and policy decision) related to these two quite different trajectories and to both parenting and schooling is the level of extraordinary development we wish to engender. What do we mean by excellence and to what degree are we willing to support it? .

Some specific domains, such as swimming, chess playing, piano playing, foreign languages, or mathematics (areas studied by Bloom 1982, 1985; Feldman 1979a, 1980, 1986; and Pressey 1955), require long, careful expert training, if excellence or prodigious achievement is desired. Development of such expertise is linear. Certainly, for a young child to be a world chess master requires unique pretuning, as well. But whether that child will later make a mature creative contribution through extending or revolutionizing a field is another matter.

On the other hand, Renaissance men and women, persons of great breadth who made immense contributions to the world, such as Michaelangelo, DaVinci, Darwin, Piaget, or Fuller, appear to have developed multiple, simultaneous enterprises, a breadth of involvements that interact with each other, and they appear to have done so early in their lives. Perhaps this is a difference between performing and productive types of giftedness (Tannebaum 1986). The linear trajectory may produce the performer in music, gymnastics, or chess playing, for example. This individual extends the field by adding a new chess move, doing the first quadruple jump on the balance beam, or

playing a sonata so exquisitely that it becomes the standard for aspiring young musicians. On the other hand, revolutionary creativity (type 7) may require going outside one's field in order to enrich it.

In a case study in preparation (Cohen), two elderly brothers—one a composer, the other best known as a landscape architect—are seen as exemplifying these two patterns. The composer became famous early in life as a piano prodigy, went on to become a well-known conductor, but shortly thereafter selected composing and now lives out his life almost unknown as a composer. His was a linear path. His brother is a Renaissance man, called by many the world's foremost landscape architect, but he is also a painter, botanist, opera singer, jewelry and fabric designer, cook, philosopher, linguist, and conservationist.

In the development of the composer who began as a piano prodigy, we see the exact pattern described by Bloom, Feldman, and Pressey: much early, intensive, expert training at the right point in history and georgraphy. In the landscape architect, however, we see a spontaneous, free early childhood of fantasy, play, and imagination. Although he was supported with books and materials (for example, he was given a book on plants at age 7 when he began a collection of tropical plants), he was not trained. This was a child at liberty to explore his world and pursue his own internal questings.

If the goal is to support linear development, we must provide the careful and proper training advocated. But if we want individuals of great breadth of vision, perhaps we must tune in to the play of childhood, providing support as the child requests it by his or her actiions or words, but not the rigorous training in a specific discipline. Such training would come as the child seeks greater mastery of a field.

*Chapter Five*

# Strategies for the District and School

At the district, school, and classroom levels, educators can overcome the barriers to development of creativity described in the first part of this Bulletin and find ways to encourage children's interest, thinking, and creativity. This chapter considers strategies at the district and school levels, and the next chapter suggests activities at the classroom level.

## Districtwide Activities

We know that expectations are intimately related to student success. If the superintendent believes that all children are good at something and capable of being thoughtful, creative individuals and he or she sets a goal of finding the gifts resident in every child, our shopping lists of valued interests and abilities can grow much longer. It should be the mission of schools to find what children are interested and proficient in and then seek ways to develop and channel those abilities, academic and otherwise.

Many other countries view their children as national resources and support development of talents and abilities beginning very early on (see Brickman 1979, Gallagher 1984, Ginsberg-Riggs 1981, Gold 1986, Sisk 1986, Torrance 1980). If our nation is to regain its position of leadership, such an investment in children's potential is a necessity.

Calvin Taylor (1985), well known in gifted education, describes the "multiple talent totem pole." Every child has strengths among the following areas: academic talent; productive thinking; communicating; forecasting, decision-making, planning (designing); implementing; human relations; and discerning opportunities. If a class of children is plotted along these strengths, there are bound to be different children who excel in each area.

A school district could ask its teachers to evaluate the process they use to identify gifts and interests in children. For example, teachers could consider the effect of their own attitudes on the process of recognizing these gifts.

**Empowerment of Teachers and Children**

Research clearly indicates the value of empowering teachers. Productive, creative teaching, as well as ability to focus on students' needs, result from such empowerment. Likewise, empowering students by giving them some say in their own education is necessary if we want active, creative minds. Kamii (1988) describes this as giving children autonomy, being governed by oneself, and having the ability to make decisions about right and wrong, true and untrue, by taking into account relevant factors. This is in opposition to heterotonomy, being governed by someone else. Children who are allowed to select their own topics for reports or stories and to negotiate with the teacher about how they will share the information with the class will not be passive learners. They will feel that teachers care about their interests and will feel more in control and more positive about themselves.

The superintendent sets the tone for empowerment by stating it as a goal and demonstrating it through empowering all members of the educational team.

**Alternative Ways of Evaluating Progress**

If our goal is to develop more creative thinkers, we must find alternatives to standardized testing. SATs and CATs are the tail wagging the dog of education. They sample only a small bit of what a child knows. Creative children particularly may have difficulty with such tests because they see more than one possible answer. Unfortunately, we sometimes have to teach them to think about what the test designer probably had in mind.

Another way to measure competence is to evaluate the child's products over time. What growth is evident in a year's collection of creative writing or mathematical problem-solving? We could apply Jackson and Messick's (1965) criteria, listed below, for judging a creative product, remembering we are applying these concepts to children well below levels 6 and 7 on the continuum.

1. unusualness (original or very rare)
2. appropriateness ("fit" of a solution to a problem)
3. transformation power (the degree to which constraints were broken and the field revolutionized, stimulating much further thought and effort.)
4. condensation of meaning (summary power—stating the complex in the most simple manner).

An alternative means of evaluating students' progress is a list of fourteen criteria proposed by Besemer and Treffinger (1981) after they extensively reviewed the literature. Their criteria are broadly categorized along three dimensions: novelty, resolution (fit), and elaboration/synthesis (combination of elements into a well-crafted whole). They suggest that individuals can learn to judge their own works using these criteria, leading to possible product improvement.

We can also consider Feuerstein's (1980) or Vygotsky's (1962) notions about what a child *does* with what he or she learns rather than just what is remembered. We can consider the developmental levels in each subject area and observe how rapidly and thoroughly the child moves through them when facilitated by loving, nurturing teachers.

When evaluation of a child is used for selection for certain programs such as talented and gifted classes, music lessons, or athletics, we must consider the "I want to" factor. In a keynote address to the Seventh World Conference on the Gifted, Alwin Nikolai (1987), a world famous dancer and choreographer, stated that he would not have been selected to be a dancer because his body was not ideal. He selected himself. He also described his experience as director of the Henry Street Playhouse. A gangly young girl with extraordinarily long arms and legs, huge feet, and large teeth wanted to become a dancer. In the beginning, she was a complete klutz, but by hard work and determination, she created herself as a dancer, one of the most electrifying of all time, Judith Jamison, star of the Alvin Ailey Ballet. How many other Judith Jamisons will we eliminate from opportunities to be what they want to be because our selection criteria omit the "I want to" factor?

**Curriculum for a Changing World**

We must design our curricula to deal with the rapidly changing world. We can no longer assume that a body of knowledge is static. Our children need to learn the "tools for further learning" (Cohen 1987g)—research skills for accessing information; thinking skills to process it; skills in creativity to modify it, relate it to disparate information, revolutionize it, or consider it in new ways; and communication skills to share it. We must give them opportunities to conduct first-hand investigations with appropriate technology and then share the results with an interested audience. We must prepare them for the changing world of work. We must also incorporate studying the future, especially in science, social studies, and career development curricula. What will the world of work be like in the year 2000, for example? What scientific discoveries, technological advances, and social changes will occur?

Children must be given skills in organization, time use, and studying. They should be expected to do homework every school night, beginning with fifteen minutes in first grade. Homework assignments should support development of connections among ideas. Creative writing assignments are well suited for this purpose. Children should also be encouraged to develop skills in use of technology but must not be deluded into thinking that such technologies are more than tools.

Gruber (1981a) says creative thought results from a network of enterprises or involvements. Seeing relationships among and between ideas is essential. If we compartmentalize each subject, this is not possible for most children. We must move to a more interdisciplinary approach that doesn't shatter the world of learning into splinters, but constructs the whole from fragments. In secondary schools, it is even more imperative that teachers adopt an

interdisciplinary approach in their teaching.

Many aspects of talented and gifted education (TAG) programs can be used successfully in regular classrooms. Thinking and research skills, futures studies, interest-based curricula, creativity, and interdisciplinary curricula all have been standard fare in TAG classrooms for years. Some of these aspects are beginning to filter into regular classrooms. For example, since 1984, many educational journals have featured articles on thinking skills. A review of curriculum and teaching materials for the gifted would be beneficial for regular classroom teachers. In fact, Whitmore (1987) suggests that we move to a gifted model for *all* education, in which each child's strengths and interests are recognized and supported, rather than the current special education deficit model that pervades our classrooms.

**Staff Development**

Districts must prepare teachers for these curriculum changes. Staff development should encourage teachers to learn by constructing relationships among ideas for themselves and then offer followup through such techniques as peer coaching and other collaborative techniques. Teachers must find their own strengths and capacity for creative thought to support the children they teach. For example, teachers could experience guided imagery, writing their own poem or story in response; could keep interactive or reflective journals; or could be given time to create interdisciplinary curricula.

University teacher training programs must focus on developing critical and creative thinkers, helping teachers find the gifts in all children, and individualizing instruction. Courses in teaching the gifted, creativity, and questioning and thinking strategies should be required of all students. Methods courses must stress individualization and finding the strengths and learning styles in each child. If we were to see our role as one of helping children to discover their interests and then nurturing and channeling them, imagine the positive effects this would have on children's self-concept and interest in school.

**Models That Work**

Districts can employ a variety of models that support interest development, thinking, and creativity. At Eastside Alternative School in Eugene, Oregon, children are ability-grouped across all grade levels for reading-language arts (these subjects should *not* be separated) and math. The school has a family-grouped homeroom spanning grades 1 to 5 to deal with affective skills. Afternoons are spent in two interest sessions that pupils select from a menu of offerings every four to six weeks, allowing choices and pursuit of interests.

Elga Brown, kindergarten teacher at Edison School in Eugene, exemplifies teaching for creativity, thinking, and interest development. Encouraging children to engage in areas of interest, structuring an environment rich in possibilities for exploration, asking "What else can we do with this material?" and above all, respecting the child as an individual, she helps each child grow

creatively and take responsibility for learning.

Stephanie Kingman models teaching for thinking and creativity in her classroom at Centennial Elementary School in Springfield. Children draw how their minds work, reflect on themselves as learners, and create wonderful stories and poems. Kingman uses such thinking strategies as Taba's Concept Attainment, Suchman's Inquiry Training, and Whimby and Lochhead's Paired Problem Solving to help her students become excellent thinkers.

At the high school level, Kathy Harrington, English teacher at Thurston High School in Springfield, models the promoting of thinking behaviors and fosters a classroom climate that supports creative development. Students work in small groups, together analyzing works of literature. They pursue their own interests in research papers and in writings of various types. Students are treated with respect and given the responsibility for their own educations.

Developing magnet schools or schools within schools is another way to offer alternatives that match student interests. Eugene, for example, offers elementary magnets with open classrooms, continuous progress programs, languages, and fine and performing arts. A computer magnet school is available at the middle school level, and high schools offer international studies.

## School-Based Activities

At the level of the individual school, the principal is the key in supporting thinking, creativity, and interest development. Setting a climate conducive to such development is an essential responsibility of the principal, working cooperatively with the staff and students. Modeling thinking and creative behavior is also beneficial.

### Grouping

Students should be allowed to move as fast and as far as they are able. By grouping children in several grades (or within a grade if there are several classes at the same level) according to ability in skills areas such as math or reading-language arts, students can receive instruction at their level of ability, alleviating both the boredom and the frustration of lock-step age-in-grade approaches. Careful assessment is needed at the beginning of the year, as is flexible grouping that allows movement up or down in each group. All children can be offered the skill area at the same time; for example, math cycle could be scheduled schoolwide at 10:30. Every available resource—reading teachers, other specialists, or even administrators—can be put on that "cycle."

Other options include continuous progress classes, ungraded primaries, grouping within the classroom, individually programmed instruction, and independent study. In any case, children should be allowed to move ahead in the basic skills as quickly as they are able and should have the opportunity to

work with others of similar ability.

Children with strong interest in reading, writing, or mathematics can be offered individualized attention or may be paired with other peers who share these interests and abilities. For example, four "high flyers" in math from three fifth-grade classrooms can be grouped to work independently, tutoring each other as much as possible.

A mastery testing program can be offered, with instruction only in areas the students don't already know. Complex areas can be reviewed to ensure that each child can employ efficient strategies. Gifted and creative children may be able to figure out solutions to quadratic equations, for example, by substituting numbers for letters, but they also need to learn efficient procedures.

### Time for Interest Exploration

At least some part of each week should be set aside for interest exploration and development. One way this might work is to have interest "clubs" that meet once or twice each week. These could range from minicourses of four to six weeks' duration that explore new areas to quarter- or year-long commitments. Students could select age-appropriate offerings that span two or three grade levels.

### Use of Resources

To extend interests, all available resources—staff, parents, retirees, community members— could be used. The interests and strengths of the school staff could be assessed. Did you know that the quiet second-grade teacher is a ventriloquist, the special education teacher an orchid enthusiast, or the custodial assistant is an expert knitter? These talents, as well as those of others outside the school, could be shared with children to build new interests or extend existing ones.

Could parents or unassigned teachers learn new things together with the children? How exciting it could be if, during Friday afternoon club, the fifth-grade teacher and two parents learn beginning knitting from the lady who cleans classrooms along with an enthusiastic group of third and fourth graders! The principal could get involved, too, sharing her love of pre-Columbian artifacts with the school family in a session on "Archeology and Me."

### Rewarding Creative Competence

It is important for children's strengths and efforts to be recognized by others. For example, the best writers in each grade could be given the opportunity to share some of their stories at a young authors' assembly. Remarkable art works by students should hang in the office. Outstanding science projects should be shared at a science fair. Instead of competing against others, children should be rewarded for their own growth. For

example, a child could be given a book for making four levels of progress in reading rather than for reaching the highest level in the class.

### Encouraging Thinking

The principal who models thinking and problem-solving behavior sets an example for both staff and students and encourages thinking in the classroom. He or she can promote a genuine spirit of inquiry through openness to events in the world, demonstrated by curiosity, interest, and a questioning attitude. The principal can employ group decision-making and problem-solving skills with the staff, or model thinking strategies such as "pair problem-solving" by alternately taking the role of listener and speaker. He or she can challenge both teachers and children to think by strategically placing questions around the school, posting quotations from famous thinkers, encouraging thinking contests such as Olympics of the Mind, or offering brain teasers in the morning or weekly newsheet.

## Invention and Creativity Conventions

Another strategy for stimulating children's creativity and interests, appropriate for either the district or the school level, is the holding of a convention that features children's creative work. About five years ago, Marian Canudo, a teacher from Buffalo, New York, held the first Imagination Celebration and Invention Convention. Her basic idea is that all children can be creative and inventive and should be given the opportunity in school to do so. Children generate a list of questions to ask community members—the very young, the old, the handicapped, parents, or friends—about what sorts of inventions are needed. Children then find ways of coming up with solutions through their own initiative, using creative thinking strategies. An "Inventor's Journal" is kept to record ideas and a log of activities, in order to protect the invention (yes, some children's ideas have received patents!) Necessary to make this process work is a climate that is accepting and nonjudgmental.

The products may be simple or complex. Such inventions as a jogging cap with a built-in fan to cool the runner by a third grader, a baby dish that sticks to the high chair tray with utensils attached on wire spirals by a kindergartener, or a clothes hanger roller to allow pants to slide off easily by a sixth grader are typical. Each invention is given an intriguing name and slogans are designed. The products are tested and marketability and price determined. During the convention, the child demonstrates the invention, describes the interview and research that went into it, and explains how it might be marketed.

Benefits to children include raising self-esteem, increasing parent involvement, assisting children with application of synthesis and knowledge skills, experiencing the scientific method, encouraging creative thinking, motivating learning, integrating the curriculum, developing library and

research skills, and enhancing higher-order thinking skills.

The idea has spread throughout the United States with prizes available for each grade level. Conventions can be held at the local school level, the district level, or even statewide. Evie Andrews, Oregon winner of the Cristie McAuliff fellowship award, used her prize to provide workshops in four regions of Oregon to about 1,000 teachers and administrators. For more information about Invention Conventions, and to obtain materials free or at cost, contact the following individuals or organizations:

Marian Canudo
U.S. Patent Trademark Office
Crystal Plaza 3, Room 11E 10
Washington, D.C. 20231
(703) 557-3071

Dr. Leonard Molotsky
Deputy Supt. of Instruction
Richardson Independent S.D.
400 S. Greenville Ave.
Richardson, TX 75081
(214) 470-5202

Invent America
P.O. Box 50784
Washington, D.C. 20004
(202) 737-1836

*Chapter Six*

# Strategies for the Classroom

In this chapter, our focus shifts to steps teachers can take to encourage their students' creativity, thinking, and interest development. As a means of organizing these suggestions, I return to the threefold classification of *for*, *of*, and *about* thinking and creativity as described in chapter 3. In accordance with this scheme, I suggest methods for setting the classroom climate (for), developing teaching strategies (of), and helping children understand the mind (about).

## For Thinking and Creativity: Setting the Climate

This section focuses on establishing the climate *for* thinking and creativity that I described in chapter 3 as critical if we are to engender thoughtful and creative behaviors.

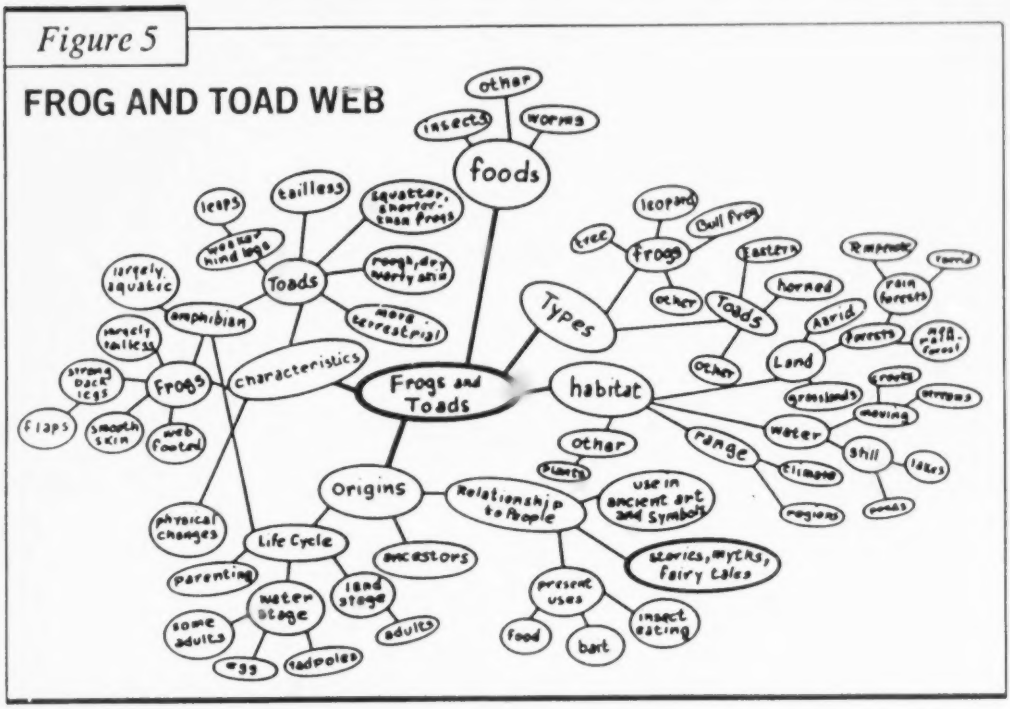
### Of Porpoises, Hard Boiled Eggs, and Other Fancy Things

A trainer used seventeen sardines to get a porpoise to recognize that creative behavior was being rewarded. Once the porpoise caught on, the number of novel behaviors was so dramatically increased that they could no longer be tallied, as the subtleties could only be recognized by another porpoise (Pryor, Haag, and O'Reilly 1969). Imagine what would happen if we apply this analogy to the classroom by rewarding creative behavior and inviting and supporting its development!

To support creative behaviors, teachers can allow for greater student empowerment and self-direction in their educations by letting children choose topics for study, times to do it, and ways of sharing products. Teachers can model creative behaviors by being curious and questioning events in the world around them with the children ("This didn't work. I wonder if it's salt or how long the eggs boiled that makes eggs sink?"), or sharing examples of their own creative products (bring in a story, painting, and so forth). Teachers can

ask open-ended questions and support many different paths to an end point. As shown in figure 5, for example, ideas for a report on frogs and toads could be webbed, and the teacher could raise questions as to where ideas suggested by children might be listed, helping the students recognize that these ideas could fit in several places. For example, "amphibian" fits both with "frogs" and with "life cycle." Other ideas could be multiply classified as well.

*Figure 5*




**Early School Experiences**

Teachers of the early grades hold the key to the child's school self-concept, future school achievement, and confidence to be creative. Bright, eager preschoolers enter kindergarten and determine their self-concept for school success in their early encounters with school. They need an inviting environment; caring, loving teachers they can trust; and a curriculum that recognizes their interests and learning styles so that they can decide that they do fit in the school setting. We know that underachievement and later at-risk behavior results from the lack of such early support. Oregon's superintendent of instruction, Verne Duncan (Oregon Department of Education 1987), recognizes these facts and has made early childhood education his top priority. Children with a positive self-concept who are autonomous are more likely to be creative.

We also need to begin to support creative development much earlier by

helping parents to recognize the importance of their children's play, answer their children's questions, provide appropriate activities, and develop autonomy. Piaget (1981) describes early childhood as "the most creative period in life until society deforms it." This may happen through subjugating the child's autonomy to the will of overauthoritarian parents or through the school setting where the child's creativity is suppressed through overemphasis on obedience, conformity, right answers, and drill.

**Messing Around**

"Messing Around" with objects or ideas is a necessary step in the creative process. We know that when a child gets a new toy, for example, she must go through an exploratory phase, learning what that toy can do, in short, "messing around" with it. Only when she finally grasps the possibilities can the toy be genuinely played with, that is, transformed or used freely at the will of the child and to her own ends.

We cannot expect a child given a microscope for the first time to immediately produce a drawing of onion skin cells from a slide. The child must have time to "mess around" (within the limits of safety of both child and machine, of course), to learn what a microscope can do before he can use it effectively.

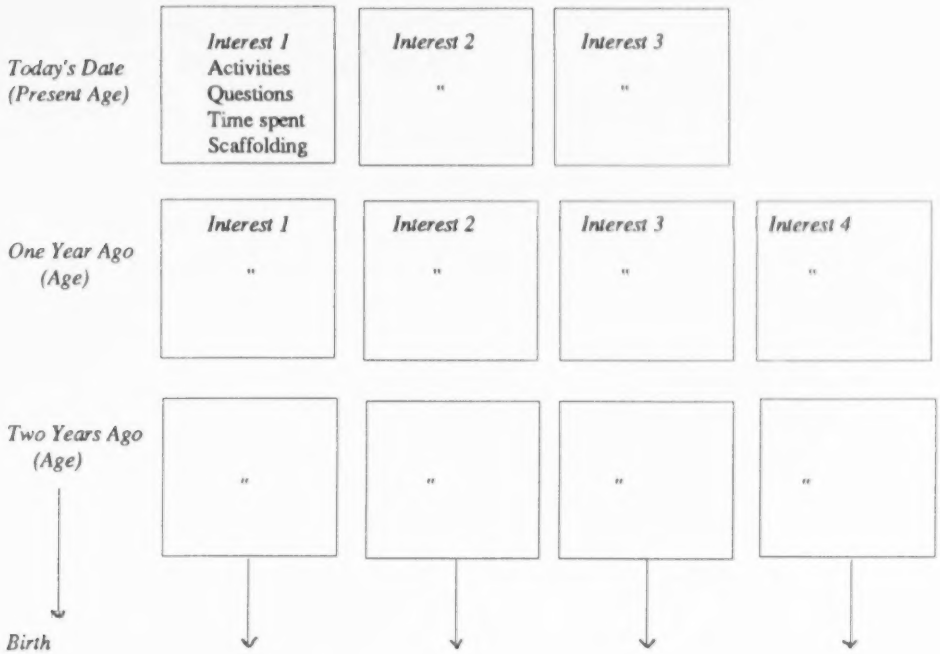
In fact, "messing around," this exploratory aspect, is seen at the base of all creative thought—the curiosity in novelty, the finding of facts, the becoming interested prior to engagement in an interest. "Messing around" and true play are essential to creativity, thought, and interest development. Play is the work of childhood. We need to support and recognize more playful aspects in the classroom. Humor helps. So does a structuring of experiences that provides time and recognizes that "messing around" may be extremely important for later high levels of growth. Sternberg (1982) found, for example, that the best problem-solvers take more time "encoding," tying in elements of the problem to everything they know, before beginning to work on the problems. "Messing around" is encoding time.

**Determining Interests and Themes**

Level 3 (demonstrating talents) is bound up with the interests and purposes of the child. To facilitate these areas, the teacher first needs to find out what the child's interests and abilities are. One possibility is to offer exposure to a variety of ideas that may engage the child. Another is to find out how the children's interests have evolved. The teacher could ask the children (as a homework assignment to do with parents) to use 3x5 cards or Post-it notes to list their present interests (one per card), capturing some detail about the activities related to that interest, and dating the card. The children could then be asked to think about what they were interested in a year ago, two years ago, and so forth, laying these in rows below the first row, as suggested in figure 6. They might be asked to see if any interests relate to others horizontally or vertically.

Vertical stackings in this interest retrospective relate to themes, enduring motifs that structure the interest based on deep questions the child is trying to answer. At this point the teacher can begin to see patterns of interest and may

**Figure 6**
**Interest Retrospective**




answer. At this point the teacher can begin to see patterns of interest and may be able to offer exposure to a new but related area that fits the child's pattern of themes and interests, or the child may suggest an area to explore.

### Teaching to Interests

The teacher may need to become a resource gatherer, finding people, materials, or places that can facilitate the child's evolving abilities and interests. For example, a kindergartner, very excited about musical instruments, shares his record, "A Child's Guide to the Orchestra." The teacher invites her friend, a French horn player, to come to class, finds other records, and takes the children to a tot's concert. This benefits not only the interested child, but opens doors for other children in the class to become interested as well.

Teachers of young children should tune in to the child's play. The

interests of the young child are very important and represent the child's attempt to regulate the self and gain an equilibrium by answering important questions. Young children should be exposed to many experiences that may open new doors to interest involvement. The more themes are involved, the more likely the child will enter a long-term engagement in a new interest, representing a shift from type 1 to type 2 interests. Loving adults should support the child's direct requests for help. "Can you help me tear off the scotch tape?" or "Please help me make jerked venison."

The child's interests can be extended by getting books about a topic of involvement from the library, offering a simple motor for Lego materials, or showing a child how to make a "wax resist" of crayon and watercolors. Finally, the involvements can be observed and the deep questions figured out, with an offer of a question, a book, or an extension to a new interest at the right moment.

It is important for the adult to allow the child to satisfy his own question. Wait until the activity is waning before offering an extension. The important thing is not to impose on the work of the child as he answers his own quest. Too often the parent or teacher is worried about the child naming letters, making numbers, or performing other recognized school skills to ensure school success. The very important studies made by the child in explorations of interests are ignored, and the child soon learns to give up these pursuits for adult-approved learning.

**Tuning in to Personal Agendas**

Preschool teachers especially must tune in to the child with a personal agenda. I observed one group of toddlers being played with by several child development students and a teacher using a large parachute and several small toys above it. The little ones were enjoying the feeling of the silk on their faces and were jumping to touch the toys. But one little boy of about twenty months had his own question. Off by himself in one corner of the room, he was dropping a yellow plastic bowling pin behind the wide wooden bar that protected the window wall. He studied how it fell, picked it up, and did it again and again. I could not tell whether it was the vertical blinds that were changing the trajectory of that object from what he anticipated or whether it was simply that the object reappeared each time he dropped it behind a barrier, but he was totally involved in this problem for over ten minutes, and no adult tuned in to his question. At least he was not dragged away to become part of the parachute group. But an aware teacher could have let him almost finish and then offer him a different object such as a ball or a block with which to continue his experiment. Or he could have been offered a different barrier, such as dropping the object into a large box or behind a fabric curtain, thereby supporting his answering of an important question.

Classroom teachers could use the retrospective technique, described in the section "Determining Interests and Themes" (see also Cohen 1987a), in parent interviews to further interest development and to understand the themes of the

individual children. We know that children learn quickly when interested in something; they have exceptional cognitive power for learning, retaining, and using the knowledge and information (DeVries 1978, Duckworth 1981, Whitmore 1987).

In fact, when children can be in control and are allowed to pursue interests, underachievement may be less of a problem. Whitmore (personal conversation, April 11, 1987) believes that interests may be less observable in older underachieving children because they have not been supported, leading to both loss of interests and underachievement. It may be that some children are more vulnerable than others (Horowitz and O'Brien 1985) to erosion of interests, while other underachievers persist in pursuing a profound, consuming interest and ignore the other school "stuff" they consider trivial.

### Child as Craftsman

Feldman (1982) suggests that children be thought of as craftsmen honing skills in a particular field. The teacher should become aware of the levels of learning in a field to support more advanced development or find a mentor or other resource person with considerable background to help the child. The teacher can allow children to pursue their interests and share them with their peers. Sometimes, time is what is needed. For instance, the gifted musician might need to be freed from other requirements to get an hour of practicing or ensemble time during school hours.

### Teaching to Themes

Teachers could teach to themes, some with the whole class, perhaps as thematic units, others for individual children. For example, if a child has a putting-it-all-together theme, he might especially enjoy geography, music, geometric puzzles, or attribute games, learning about the boundaries (biggest, smallest, oldest, tallest, loudest, or softest). Such a child might relish techniques such as mind mapping, webbing, finding associations or relationships, using reflective abstraction, putting into relationship, or synthesizing (Cohen 1986, 1987f).

For children with a power variation on the control theme, rocketry, aviation, and volcanoes are naturals. Such children (or all those with a control theme) would enjoy fantasizing about the magical power they would most want in a story they write. Those children with a getting-attention theme might have a part in a play or put on a class talent show. Children with a control/independence theme would particularly need a class climate where they can feel in charge of their learning experiences. In fact, as the control theme is central to all the bright children studied, a classroom for the gifted must support autonomous development, the chance to control the self and the environment. It would certainly benefit all children as well. Thus, Betts' (1985) Autonomous Learner Model is especially appropriate, as are open classroom and facilitative teacher models (Cohen and Hackman 1979).

Children with a nature-nurture theme could be in charge of plant or pet

care. They might make a terrarium, write a story about an animal, help in the special education classroom, or be special friend to a new child to the class. Children with people/relationships themes might also do these last two activities, as well as writing about an interesting person they have known, looking at different ways people (or animals) communicate, or conducting a survey on moral issues or on how to be a friend.

Those youngsters with aesthetic/expressive themes would enjoy "sharing time," creative dramatics, art and music activities, or creative writing. The aesthetic and sensual sides of all children should be developed, helping them to observe and appreciate the wonder around us. Going for a magical mystery walk where each child tries to find something wonderful or new to share with the class could appeal here. Children could look for signs of spring, aesthetics of form in function (designs of street lighting or manhole covers, for example), life underground, Victorian architecture, or simply something they think no one else has noticed.

Children with cognitive-skill-acquisition themes surprisingly may not be the teacher's dream, especially if they come to school with abilities far above their classmates. It is critical that such children be allowed to pursue these skill areas at their level of ability and with their own pacing to maintain the interest. Sometimes a mentor or resource person may be needed to help such a child. One boy in my study of gifted young children had extraordinary math skills going into the first grade (he knew all the squares of numbers up to 450 and the cubes up to 150, had figured out all manner of number patterns, and could multiply in his head three-digit by three-digit numbers interpreted from the beep sounds on his calculator as fast as the machine). This child spent hours each day on mathematics and computing. Clearly, any first-grade teacher would need help with such a child.

A final suggestion for older children is that they could study their own interest patterns. One of my graduate students had her class of fifth-grade children do a retrospective study on themselves with the aid of their parents, baby books, photographs, and artifacts, with a classmate helping them reconstruct memory. Children could also ask themselves "What are my BIG QUESTIONS?", beginning to develop metacognitive awareness as well as thinking about their interests and themes. They could look for theme intersections and try to display their theme and interest patterns in an image. Such a technique might be useful in considering career directions as well.

**Encouraging a Sense of Purpose**

Teachers can support long-term, purposeful involvements in their students, as creativity requires commitment and purpose. The seven-year-old girl who is crazy about horses, for example, can read about them, draw them, learn about their history, breeds, and training. Instead of basal reading, she could do a research report on horses with help from the teacher or librarian. It is the consuming passion for a subject and the willingness to wrestle with difficulties that marks the creative person. The same little girl may try to change the

perspective in drawing horses from side views to front views by attempting dozens of drawings, for example. Such passion also greatly enhances true learning. The reading skills develop because there is a purpose for reading, as the child in our example must find out everything she can about horses.

Above all, it is important to consider the child's purposes seriously and to support and encourage intense commitment. One very gifted young writer in my fifth-grade class used to spend thirty to forty hours per week on her writing assignments. At times, she would come to school tired and be less than interested in math or social studies, but how marvelously she wrote! I wish that I could write now, in my forties, as this little girl wrote at ten! (see Cohen and Kamihira 1987).

**Stimulating Thinking: A Few Simple Things**

To improve the quality of student thinking, the Association for Supervision and Curriculum Development (1984) recommends that teachers do a few simple things: First, when you ask questions, allow sufficient wait time for students to think. When you provide this time (5-10 seconds is a start), children don't feel pressured into hasty or sloppy thinking. Follow up on student responses, asking students to clarify, provide evidence, elaborate, or state how they got the idea. Have students ask questions, and plan for this type of activity in the classroom.

Ask questions that elicit higher levels of thought. Questions that begin with what, where, or when do not move beyond recall of facts. Ask more why, how, and what if questions. Recognize that if you want the child to be expansive in his or her answer, the question must provide the clue. For example, instead of asking a group of first graders, "How can you tell it is spring?" the question should be phrased, "Think of all the ways you can tell it is spring." This asks the child to be exhaustive.

Help children look for clue words in questions. For example, words like "most," "best," or "in your opinion" ask a child to evaluate information. I have found that teaching children in upper elementary grades the types of questions that can be asked improves their ability to take tests, particularly with essay questions. I teach them fact questions, inference questions, convergent questions, divergent questions, and evaluative questions, each with an example of what might be on a test in a subject area we are studying. Giving extra credit on a test for correctly identifying the type of question asked helps the child know the type of answer to provide.

**Recognizing Different Strengths**

Finally, teachers can recognize and support the development of different strengths in their classes—the special areas in which each child excels. By finding the gifts in every child in the classroom, all children benefit in development of potential for creativity. Setting the climate for creativity and thinking is probably *the* most important step schools can take to ensure movement up the creativity continuum.

## Of Thinking and Creativity: Resources for the Development of Creativity, Interests, and Thinking

In this section, we consider resources to teach specific strategies *of* thinking and creativity. *Of* thinking and creativity refers to the "how to's," the techniques and heuristics for solving problems or dealing with information. (For additional information about the strategies for teaching thinking that were listed in chapter 3, see Costa 1985b.) We shall look at creativity training programs, imagination and imagery, mode switching, and teaching to themes.

### Creativity Training Programs

Several major creativity training programs deal with specific skills or steps in developing creativity. According to Mansfield, Busse, and Krepelka (1978), the most commonly used programs are as follows:

1. *Productive Thinking Program.* (Covington and others 1972). The training consists of programmed instruction for solving of largely convergent problems for upper elementary pupils, based on a self-instruction model.

2. *Purdue Creative Thinking Program* (Feldhusen and others 1971). This program fosters divergent thinking abilities—verbal and figural fluency, flexibility, and elaboration as well as problem-solving for elementary pupils. It consists of twenty-eight audio tapes along with printed exercises.

3. *Creative Problem Solving Program* (CPS) (Parnes 1972). Perhaps the most successful, this program deals with older students who have developed sufficient competencies to consider possibilities systematically in a step-by-step approach to solving problems. This model might be especially useful at a particular node in the creative process where the creator is frustrated and needs a systematic procedure to help clarify the problem. CPS is the model used in future problem-solving. Training in the basic process of CPS is available through the Creative Education Foundation, which sponsors the Creative Problem Solving Institute in Buffalo and at the Epcot Center, Florida.

4. *Myers-Torrance Workbooks* (1964, 1965, 1966a, 1966b, 1968). Stimulating the imagination and inducing originality in fun-type open-ended questions are the objectives of this resource.

5. *Khatena's Training Program* (1970, 1971a, 1971b, 1973). This training program involves breaking away from the obvious and commonplace, transposition, analogy, restructuring, synthesis, and the active use of imaging and imagination.

An additional training program is DeBono's (1976, 1985) CoRT program to enhance lateral thinking. It assists the individual in seeing patterns, finding alternatives, dealing with perceptions, and transferring ideas to other areas.

Any of these programs is more likely to lead to level 5 (being producers) along the creativity continuum, rather than levels 6 or 7 (mature creativity). However, developing systematic approaches to deal with problems (see particularly Parnes), learning how to break away from the obvious (see Khatena), and developing a climate that supports divergence are all likely to be supportive of later creative development. Many of the same programs listed in chapter 3 for the development of thinking are conducive to creative development as well.

Use of S.C.A.M.P.E.R. (Eberle 1977), in which the child learns to apply a checklist of verbs to help change one's mental set, such as substitute, combine, adapt, magnify, minify, modify, put to other uses, eliminate, and reverse or rearrange, helps develop ideational fluency and flexibility as well as associational ability. Idea-stimulating techniques described by Parnes (1977) and Feldhusen and Treffinger (1980) are also useful, particularly for level 4 (solving problems). These techniques include forced relationships in which a problem statement is presented and a list of unrelated objects offered, each of which must be "fit" to the problem; catalog techniques in which the list (as above) of objects is randomly drawn from a catalog; focused relationships, similar to the above, but more directly related to the problem at hand; and arbitrarily forced relationships, in which no problem is stated, but two objects are selected randomly and forced together, sometimes known as the "fish bowl" technique.

Another approach is "Synectics," proposed by Gordon (1961, 1971) and Prince (1977). Synectics uses analogy and metaphor to help users find relationships between things to make the strange familiar and the familiar strange. It is the joining or associating together of apparently different and seemingly irrelevant objects. This approach can be very helpful in encouraging the relating of new information to what the child already knows.

**Imagination and Imagery**

Developing imagination and imagery is another useful technique for enhancing creativity. For example, guided imagery can stimulate writing skills. Having children relax, close their eyes, and go on a mind journey to the words suggested by the teacher is a good way to stimulate alpha rhythms in the brain associated with creative acts and to bring to consciousness ideas connected to the writing theme. For example, if the teacher wanted the children to write poems on spring, she might ask questions about what they see, smell, hear, and feel on their imaginary journey into a spring day.

Simply asking students to close their eyes and think helps in "centering," getting into one's own mind and ideas without the distractions of the outside world. Asking senior high students to think about the process of mitosis, for example, by closing their eyes and "seeing" or imaging it, will likely produce

better explanations on a test.

Use of images or metaphors to tie together large amounts of information in a shorthand form has been described by Gruber (1977). In fact, highly creative people use "images of wide scope" that act as a gestalt and serve as a base on which to hang details, allowing the creator to gain objectivity and communicate difficult material in simple form. Darwin, for example, used the image of an irregularly branching tree of nature to help him conceptualize *The Origin of Species*. Teachers could have students read a chapter in history or biology, for example, and create a single page image (figural, symbolic, or semantic, or a combination thereof) to tie together the information (level 1 creativity).

Students could also keep a log of how they got the ideas (what other aspects of their mind-map got pulled in to making the metaphors and connections) as well as what the various symbols represent. By sharing these images and reflections with peers, they develop awareness of others' perceptions of the same topic. Of course, these last suggestions deal more with *about* creating—the metacognitive aspects.

### Mode Switching

Using mode switching strategies is another technique. In addition to images, students could represent verbal material with symbols or with psychomotor actions. To represent the process of phagocytosis, for example, a group of students could be asked to physically enact how the white cells engulf the bacteria. Alternately, if material is presented in a different mode (image, physical, behavioral, or symbolic) they could use verbal modes for processing it.

## About Thinking and Creativity: Metacognitive Strategies

In learning *about* thinking and creativity, the child studies creative and thoughtful people, how the brain works, and metacognition.

### Studying Creators

Children can read biographies and autobiographies about famous creators, inventors, and discoverers: Thomas Edison, Benjamin Franklin, Louis Pasteur, Marie Curie, George Washington Carver, Leonardo Da Vinci, and Michaelangelo for starters. They can also study living creative people like a teacher, writer, or each other doing creative things. For example, they might study how students got ideas for the Torrance Figural Test of Creative Thinking, item 1. This is either a bean- or egg-shaped piece of sticky paper to be stuck to a page and integrated into an original, elaborate drawing and then titled. The teacher might raise questions (for example: "I wonder if first graders would do it the way you do?") that could trigger ideas for future study.

### How the Mind Works

Students can discover the ways their brains work. Children might be asked to draw pictures of how their minds work, perhaps as a kickoff to studying the brain. This activity should be focused on creative ideas, not realistic drawings. The various conceptions could be shared and compared to how the mind was viewed over history. Sylwester's (1978) hand analogy is a useful way of describing the brain. The child makes two fists and lays them together, fingernails matching, as in the top part of figure 7. Each part of the brain can then be made analogous to a location on the hands. The teacher can select among the drawings, depending on the level of complexity he or she wishes to share with students.

Asking children to watch each other's eyes moving while they are solving a math problem allows the child to look for hemispheric activity. As the eye is worked by the opposite brain hemisphere, if the child is looking to the right, the left hemisphere is engaged; to the left, the right hemisphere; and in the middle, both or the corpus callosum. It's easiest if observers simply indicate whether the eyes are to their own right or own left as they face their partner. The children could design some interesting experiments related to this saccadic eye movement and hemispheric activity. For example, in solving math computation problems, which hemisphere is used? In solving math story problems, what happens? What would their hypothesis be prior to testing and why?

The teacher might also ask the students to be aware of their best creative thinking environment. Students could be assigned to think about a problem lying in a darkened room. Do they think best lying on their left side, right side, or flat on their backs? With Bach, Rock and Roll, or silence?

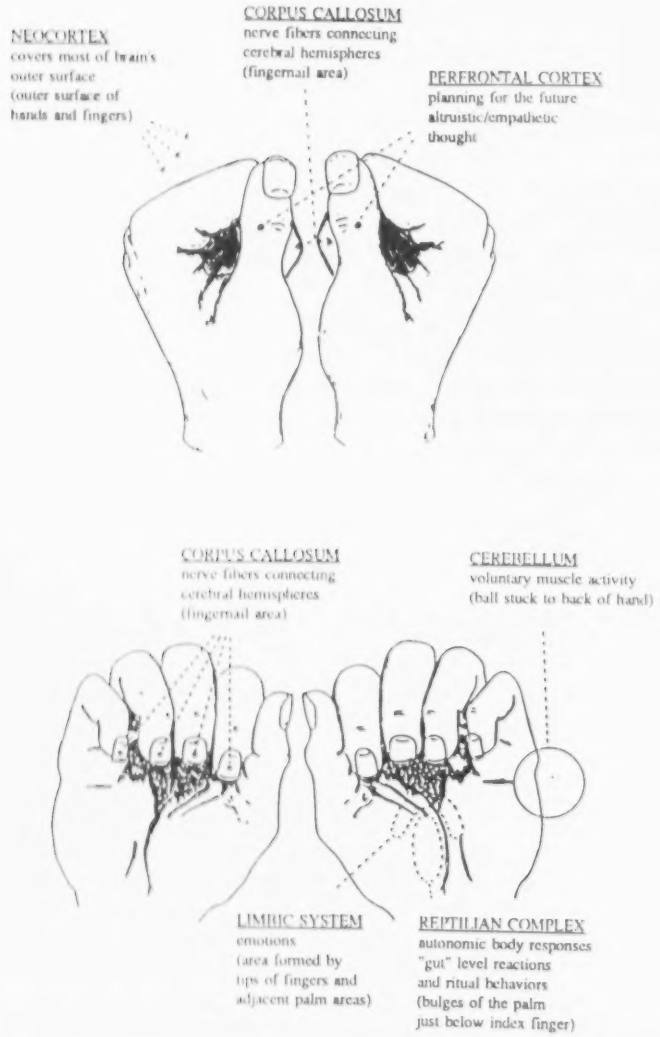
### Metacognition Strategies

Metacognition means an awareness of one's mental activity. It can be developed through the imaging activity (see the section "Imagination and Imagery") and tracing the patterns of one's interests (see the section "Teaching to Themes"). Keeping a journal of one's connections or using an interactive journal is another technique. The latter can be used at any grade level. It might occupy the last ten minutes of a social studies class or the end of the school day. Students could be asked to react to the lesson or day and to discuss what they learned and how they felt. These responses are collected, read by the teacher, and commented on (positively) in a sentence or two. No corrections are made, just a dialogue stimulated to get ideas shared. The tone in the class will be more conducive to creativity, and the students will begin to become aware of their mental processes.

In a notetaking technique useful for promoting metacognition, a piece of paper is divided with a wide left margin about one-third of the page across. On the right, notes are taken in class or from books. On the left, connections, questions, and personal ideas are jotted; this represents the inner dialogue.

**Figure 7**

## A Brain in Your Hands:
## A Simplified Model of the Human Brain


NEOCORTEX
covers most of brain's outer surface (outer surface of hands and fingers)
CORPUS CALLOSUM
nerve fibers connecting cerebral hemispheres (fingernail area)
PREFRONTAL CORTEX
planning for the future
altruistic/empathetic thought
CORPUS CALLOSUM
nerve fibers connecting cerebral hemispheres (fingernail area)
CEREBELLUM
voluntary muscle activity (ball stuck to back of hand)
LIMBIC SYSTEM
emotions (area formed by tips of fingers and adjacent palm areas)
REPTILIAN COMPLEX
autonomic body responses "gut" level reactions and ritual behaviors (bulges of the palm just below index finger)
NEOCORTEX (Brain's outer layer. Outer surface of hands)
FRONTAL LOBE
mechanism for problem solving and decision making
SENSORY-MOTOR CORTEX
Controls movement
-leg and foot
-rest of body
face and mouth
Sensory information
-from skin, joints, and other tissues (area around fourth finger)
PREFRONTAL CORTEX
planning for the future
altruistic/empathetic thought
OCCIPITAL LOBE
visual information (area overlaying little finger)
TEMPORAL LOBE
information from the ear (area on back of hand behind middle finger)

*Derived from Sylwester 1978 by Donald Ambrose 1988*

When papers are written from such notes, the metacognitive aspect plays a key role, supporting creative connections. Another technique is to use three different color pens when taking notes. Blue is from lecture or text, red is for reflections and personal thoughts about the topic, and green is to highlight important items to return to and think about more.

Older students could study something new they always wanted to learn, such as skiing, French cooking, or calligraphy, perhaps for an English or psychology class. The term project is to keep a metacognitive journal of their development in that subject (Feldman 1980), paying particular attention to stages, transitions, and events that helped them move to a higher level.

Perkins (1981) suggests "Thinking Aloud" techniques to study one's creative processes as they happen. He finds that having people be introspective and report on their thoughts during or immediately following episodes of invention does not seriously disrupt the creative process. Students should be paired for this activity, the "researcher" sitting unobtrusively to one side of the "creator," taking notes, and prompting on principles 2, 3, and 5 (below), particularly 2—"What are you thinking now?"—if the creator does not talk. To begin, try using an art activity rather than a verbal one. Tape recorders or video cameras might be useful tools, too. Students can then switch roles. The six principles to promote a complete record are:

1. Say whatever's on your mind. Don't hold back hunches, guesses, wild ideas, images, intentions.
2. Speak as continuously as possible. Say something at least once every five seconds, even if only "I'm drawing a blank."
3. Speak audibly. Watch out for your voice dropping as you become involved.

   To discourage overexplanation:

4. Speak as telegraphically as you please. Don't worry about complete sentences or eloquence.
5. Don't overexplain or justify. Analyze no more than you would normally.
6. Don't elaborate past events. Get into the pattern of saying what you're thinking now, not of thinking for a while and then describing your thoughts (Perkins 1981).

Discussing how students arrive at certain ideas or answers stimulates metacognitive awareness as well as the notion that there is no single right way to think creatively. For example, the teacher could ask students how they came up with ideas for making masks, solving a math problem, or writing a story. "How did you get started? Did you think of a lot of ideas first and then select the best? Or did you get an immediate flash of an idea and begin to work? Did you plan and outline it?" The teacher could also stop the class after presenting some information and ask the students, "What are you thinking about right now?" encouraging the tying in of new material to familiar notions.

As the child is listening to or reading information, there should be a mental dialogue going on in his or her mind in which the new is related to the familiar.

Paired problem-solving, suggested by Whimby and Lochhead(1982), would be another strategy to consider for this activity. One student takes the role of listener-receiver; the other, the thinker-doer. The listener responds to the thinker by asking questions or eliciting information. The thinker shares his or her thought processes, perhaps writing down ideas. Then roles are reversed. It is important for children to realize that we each approach a creative activity differently and that there is no right way to write a story or to do an art project.

# Conclusion

Because typical definitions of creativity do not apply to creativity in children, in this Bulletin I have proposed a broader conception—a developmental framework that encompasses a range of creative behavior from infancy to adulthood. The Continuum of Adaptive Creative Behaviors bridges the gap between universal constructions of novelty found in all infants and the highest level of creativity in which a field is revolutionized. In this view, creativity is involved in all new learning, as novelty must be constructed by the individual.

By taking this developmental view, both the pinpointing of the stage in which a child is functioning and the direction for instruction are provided. Two areas in particular need work, however. The first is determining the stages of development in nonuniversal domains so that a child's talents can be fully enhanced and appropriate instruction offered. The second is the operationalizing of each level of the continuum in the form of a checklist that could be used to identify both children at risk for low levels of creativity and those especially at promise, both of whom need special support.

Thinking—how humans exercise intelligence and adapt to their world—is the mechanism for creating. Teaching *for* thinking by setting an appropriate climate, *of* thinking by promoting specific strategies, and *about* thinking by studying thinkers, the brain, and metacognitive processes is parallel to teaching *for*, *of*, and *about* creativity.

I suggested mode shifting from one representational form to another as a thinking strategy. Two aspects are particularly significant here. The first is the importance of integrated learning. Educators work with *whole* children, not just their cognitive abilities, and not just in limited areas such as spelling or arithmetic. Teachers must see the child as having evolving systems of affect and purpose, as utilizing the physical and perceptual systems, as well as cognition. When the teacher supports the development of the whole child, the greatest possibility for creativity, thinking, and interest growth occurs.

The second aspect is utilizing mode shifting as a teaching strategy. Use of metaphor as a teaching strategy is not new. However, teaching children to utilize imagery, symbolic thought, and physical action in addition to verbal modes and teaching them to select the language of thought most appropriate

for each individual's needs are ideas worth considering and consistent with current information processing notions.

Very little research has been done on the interests of childhood, except on toy preferences. Because interests are central to the child's self-regulation—to the resolution of big questions deep within the systems—educators must recognize their importance. By understanding how interests are structured and recognizing the major themes of childhood, the curriculum can be focused on these areas, reaching children in significant ways. Interests and themes are the seeds of mature creative development (the interests being the content and the themes related to the purposes). Hence we must support their development if we are to assist children in reaching the highest levels of creativity.

A reexamination of play, interest development, self-regulation, and autonomy in early creative development is needed. Policy implications for interdisciplinarity, especially at the secondary level, should also be considered. If we want Renaissance men and women, revolutionary creators with great breadth of vision in addition to those who can create by extension within their own field (type 6), we must tune in to the development of varied interests through the play of childhood so that ideas from one area can fertilize another. We must provide opportunities in the classroom for a variety of interests to emerge and for creative development to occur.

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